

IDAHO DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

**FEDERAL AID IN FISH RESTORATION
Job Performance Report
Project F-71-R-16**



REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

**Job No. 4-a. Region 4 Mountain Lakes Investigations
Job No. 4-b. Region 4 Lowland Lakes and Reservoirs Investigations
Job No. 4-c. Region 4 Rivers and Streams Investigations
Job No. 4-d. Region 4 Technical Guidance**

By

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JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management
Investigations

Project No: F-71-R-16

Title: Region 4 Mountain Lakes
Investigations

Job No.: 4-a

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

Stocking of alpine lakes without road access by regional personnel included 22 lakes with 13,700 cutthroat trout Oncorhynchus clarki, 16 lakes with 10,500 rainbow trout O. mykiss, and 2 lakes with 2,200 grayling Thymallus arcticus.

Brown trout Salmo trutta releases in Upper Box Canyon Lake to control stunted brook trout Salvelinus fontinalis were unsuccessful. Gill nets sampled 63 brook trout with a mean length of 186 mm. Lengths ranged from 99 mm to 230 mm. No brown trout were sampled. Basic mountain lake data was compiled.

Author:

Fred E. Partridge
Regional Fishery Manager

OBJECTIVES

To maintain information for fishery management activities and decisions for mountain lakes.

METHODS

Fingerling fish were stocked in alpine lakes from a helicopter and by backpack by management personnel.

Fish populations in alpine lakes were sampled with 38 m by 1.8 m variable mesh gill nets, with five different sections varying from 19 mm to 64 mm square mesh, and by angling. Lake area was estimated from a U.S. Geological Survey 7.5-minute topographic map. Depths were sampled with a Lowrance Fish Lo-K-Tor from a rubber raft. Water samples were collected and analyzed the following day with a Hach kit for alkalinity and hardness, and conductivity was sampled with a Sulu Bridge conductivity meter.

RESULTS

Alpine Lake Stocking

A total of 37 roadless mountain lakes were stocked with fingerling fish by management personnel in September 1991. Twenty-two lakes received 13,700 Henry's Lake cutthroat trout Oncorhynchus clarki, 16 received 10,500 Mt. Lassen rainbow trout O. mykiss, and 2 received 2,200 grayling Thymallus arcticus (Table 1). Due to low water levels in Windy Lake, the scheduled fish were stocked in Laidlaw #1. Fish were observed in this lake from the helicopter during stocking. Additionally, Perkons Lake did not receive any rainbow trout in 1991 and Middle Rainbow Lake received cutthroat trout in addition to its scheduled rainbow trout.

Upper Box Canyon Lake

Upper Box Canyon Lake is located in the headwater area of Box Canyon, a tributary to the Little Wood River (Sec 27, T5N, R20E - UTM 4,845,780 N, 736,110 E). It lies in a south-facing cirque basin at an elevation of 2,947 m and has an area of about 0.8 hectare. It is an oligotrophic lake with an alkalinity level of 28 mg/l, hardness of 51 mg/l, and conductivity of 51 μ mhos/cm (on September 17, 1991). The maximum depth measured was 7.5 m (Figure 1). Inlets from snow and spring flows along the west end of the lake provide about 30 m of spawning area.

Access to the lake is moderately difficult via a steep trail (4 km) over Johnstone Pass from the East Fork Big Wood River, resulting in light to moderate fishing effort.

Fish populations in Upper Box Canyon Lake were sampled with a single gill net on August 3, with two nets on September 17, 1991, and by angling on August 3. A total of 63 brook trout Salvelinus fontinalis were netted and 13 caught by angling. Also, numerous fry were observed in the shallow inlet area. Brook trout ranged from 99 mm to 230 mm, with a mean length of 185 mm (Figure 2). Maturity checks showed mature males starting at 158 mm and females at 170 mm.

One hundred brown trout Salmo trutta were stocked in Upper Box Canyon Lake in September 1988 at 6.8/kg to provide a predator to reduce density of the brook trout population. This release was apparently unsuccessful, since no brown trout were observed and the lake continues to have a stunted brook trout population.

Table 1. Back country lakes stocked in Region 4 by management personnel in 1991. Lakes are stocked by helicopter unless otherwise noted.

National Forest	Drainage/Lake	Catalog number	Species ^a	Number of fish
Sawtooth	Raft River ^b			
	Independence #1	05-00-00-0223	CT	1,000
	Independence #2	05-00-00-0224	CT	1,000
	Independence #2	05-00-00-0224	GR	1,200
	Independence #3	05-00-00-0225	CT	800
Sawtooth	Little Wood River	11-00-00-0111	CT	500
	Laidlaw #01	11-00-00-0119	CT	500
	Nip N'Tuck	11-00-00-0115	CT	500
Sawtooth	Big Wood River			
	Little Lost	11-00-00-0152	CT	500
	Big Lost	11-00-00-0153	CT	1,000
	Big Lost	11-00-00-0153	GR	1,000
	Amber	11-00-00-0155	CT	500
	Window	11-00-00-0156	CT	500
	Hidden	11-00-00-0158	CT	500
	Norton #1	11-00-00-0160	RB	1,000
	Norton #2	11-00-00-0161	RB	1,000
	Miner	11-00-00-0164	CT	500
	Prairie Cr. #1	11-00-00-0166	RB	500
Sawtooth	Titus Cr.	11-00-00-0171	CT	500
	South Fork Boise River			
	Heart	10-00-00-0164	CT	700
	Boardman	10-00-00-0165	RB	500
	Deadwood	10-00-00-0166	RB	500
	Goat	10-00-00-0167	RB	1,000
	Little Bear Cr.	10-00-00-0169	CT	500
	Bass Cr. #1	10-00-00-0171	RB	500
	Bass Cr. #2	10-00-00-0174	RB	500
	S.F. Ross F. Cr. #1	10-00-00-0176	CT	500
	S.F. Ross F. Cr. #2	10-00-00-0177	CT	500
	S.F. Ross F. Cr. #4	10-00-00-0179	RB	500
	Johnson Cr.	10-00-00-0182	RB	500
Boise	South Boise			
	Nort Sta Rive	10-00-00-0119	RB	500
	Potte	10-00-00-0122	RB	500
	Smit	10-00-00-0123	RB	500
	Hideway	10-00-00-0127	CT	500
	Green Cr.	10-00-00-0133	CT	500
	Fiddle	10-00-00-0141	CT	700
	Big Lookout	10-00-00-0142	CT	1,000

Table 1. Continued.

<u>National</u> <u>Forest</u>	<u>Drainage/Lake</u>	<u>Catalog</u> <u>number</u>	<u>Species^a</u>	<u>Number</u> <u>of fish</u>
	Middle Rainbow	10-00-00-0151	RB	1,000
	Middle Rainbow	10-00-00-0151	CT	500
	Big Rainbow	10-00-00-0152	RB	1,000
	Heart	10-00-00-0153	RB	500

^a CT = Henry's Lake cutthroat, GR = Grayling, RB = Mt. Lassen rainbow.

^b Stocked by backpack.

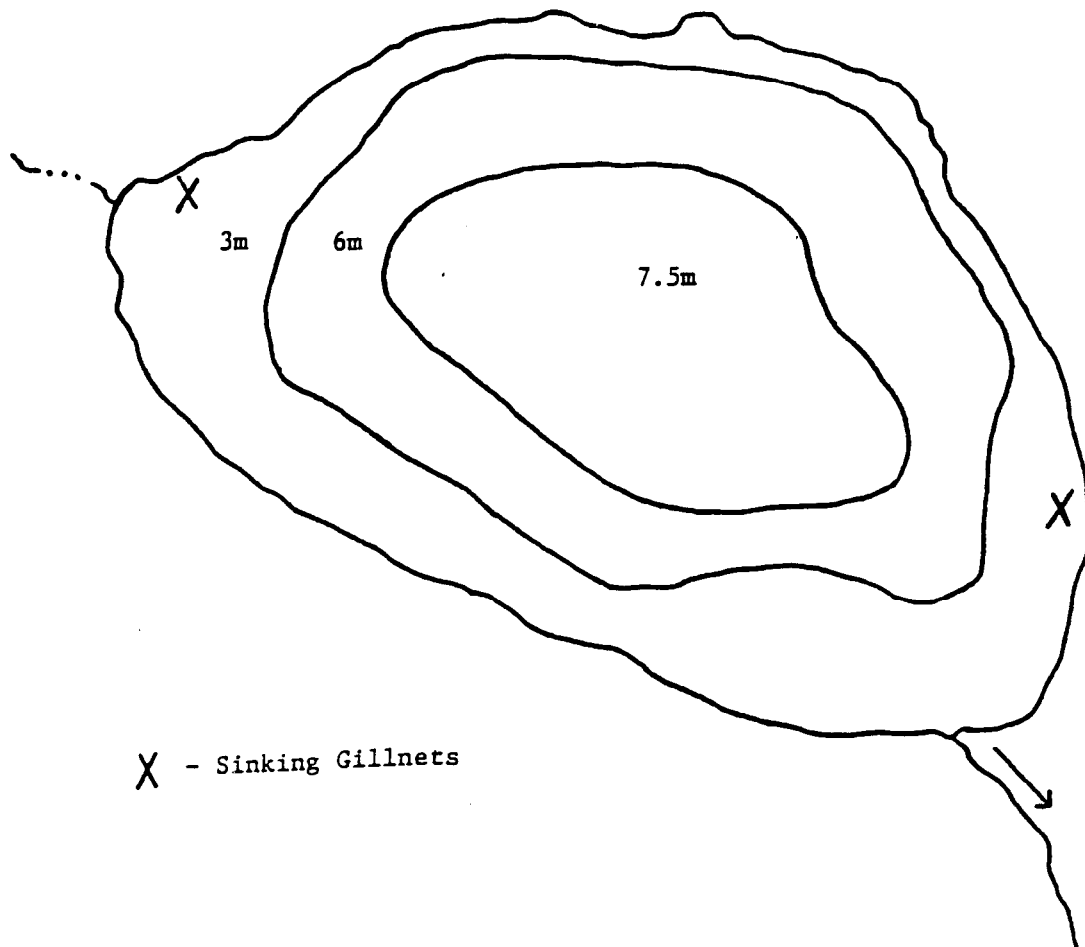
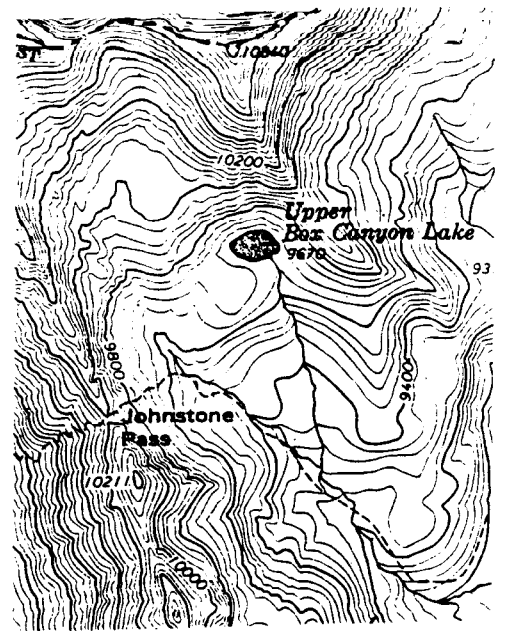
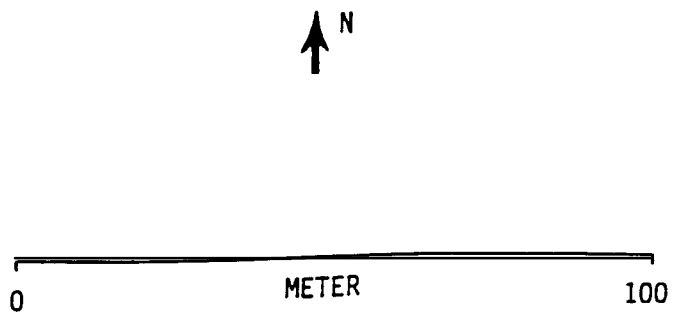


Figure 1. Location of gill net sites and depth profile in Upper Box Canyon Lake.

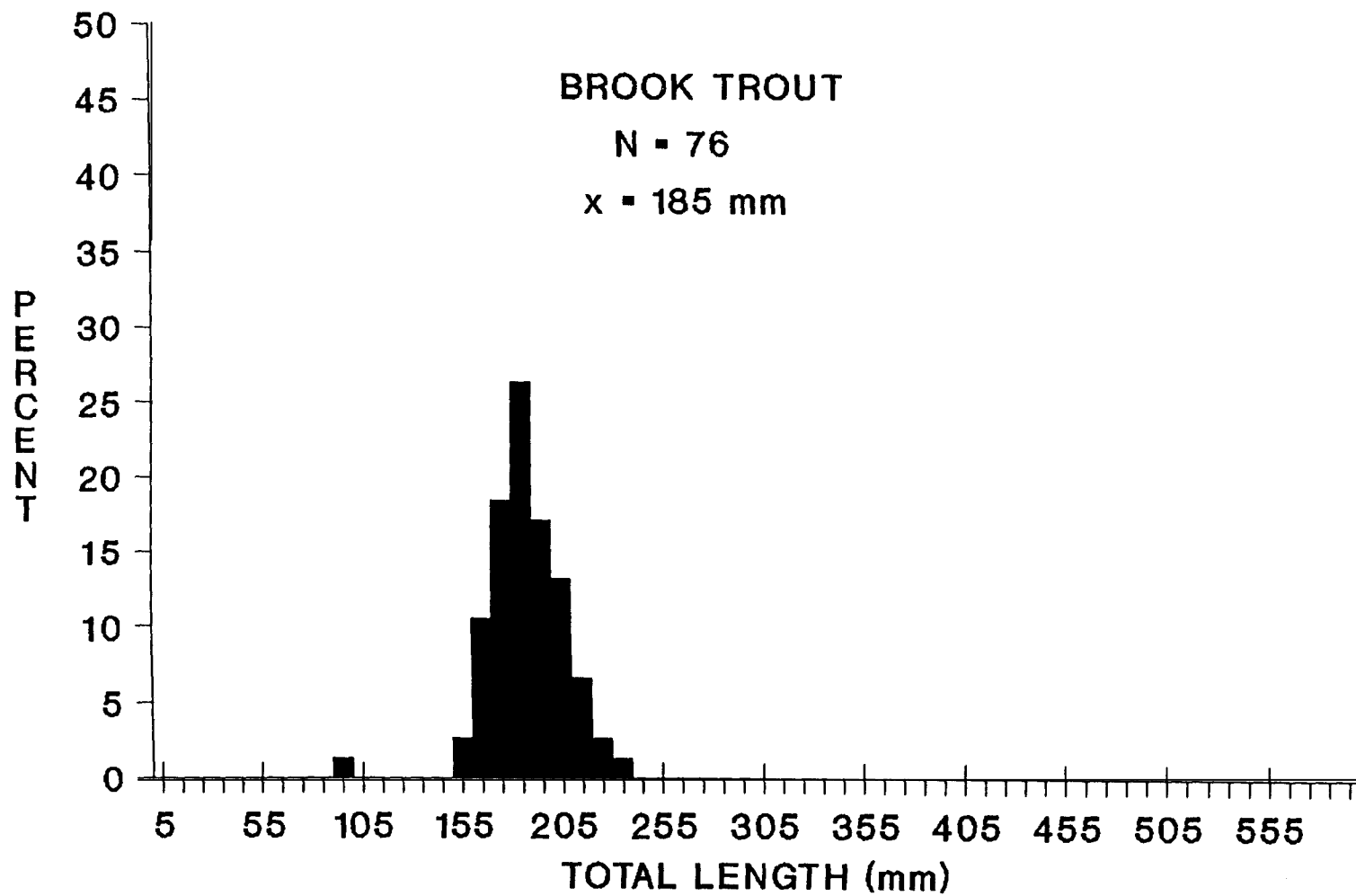


Figure 2. Length frequency of brook trout sampled in Upper Box Canyon Lake during 1991.

ACKNOWLEDGMENTS

The U.S. Forest Service, Sawtooth National Forest, provided the helicopter time to stock the high mountain lakes. Fisheries aides Christie Cockerham and Jane Mauser assisted with stocking and data collection.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management
Investigations

Project No: F-71-R-16

Title: Region 4 Lowland Lakes and
Reservoirs Investigations

Job No.: 4-b

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

Angler effort on Lower Salmon Falls Reservoir was 43,600 hours from December 1990 through November 1991. Anglers caught an estimated 12,400 fish and harvested 9,600. Rainbow trout Oncorhynchus mykiss accounted for 5,700, followed by bluegill Lepomis macrochirus 2,700, yellow perch Perca flavescens 1,000, and other species 200.

Game fish accounted for 17% of the fish electrofished (N = 202) and 12% of those netted (N = 178) in Lower Salmon Falls Reservoir in July. Game fish sampled were largemouth bass Micropterus salmoides, bluegill, rainbow trout, brown trout Salmo trutta, yellow perch, smallmouth bass M. dolomieu, mountain whitefish Prosopium williamsoni, and brown bullhead Ameiurus nebulosus, in decreasing order of abundance. largescale sucker Catostomus macrocheilus and Utah chub Gila atraria were the most numerous nongame species. Largemouth bass proportional stock density (PSD) was 62, with the maximum size being 445 mm. The maximum size of rainbow trout was 505 mm (mean = 316 mm).

Spring population estimates in the Upper Bruneau Sand Dunes Pond showed densities of 222 bluegill (≥ 150 mm) per hectare. Largemouth bass densities were 66/hectare (≥ 180 mm). The numbers of fish sampled in the lower pond were insufficient to estimate a population. PSD for largemouth bass in the upper pond was 18 and 88 for bluegill. PSDs in the lower pond were 64 for largemouth bass and 100 for bluegill.

Common carp Cyprinus carpio were the dominant species found in Stone Reservoir in June. Fish species composition sampled by electrofishing (N = 216) included common carp (73%), yellow perch (21%), largemouth bass (4%), and rainbow trout (2%). In gill nets (N = 132), the percentages were 95%, 2%, 1%, and 3%, respectively. Only two carp were sampled in trap nets. Largemouth bass ranged from 65 mm to 465 mm, and rainbow trout 250 mm to 400 mm.

Spring gill netting in Magic Reservoir sampled 164 fish, comprised of 74% bridgelip sucker C. columbianus, 23% rainbow trout, and yellow perch. During 1983-84, yellow perch accounted for 15% to 80% of the gill netted fish. Other species present in 1983-84 but not sampled in 1991 include brown trout and reidside shiner Richardsonius balteatus.

Electrofishing in July in Dierkes Lake sampled 173 bluegill and 108 largemouth bass. PSDs were 4 and 24, respectively. Water temperatures ranged from 20°C at the bottom (8 m) to 23.5°C at the surface.

Wild rainbow trout have established in the Niagara Springs Wildlife Management Area ponds. Estimated populations in June were 913 (456/hectare) in the upper pond and 316 (198/hectare) in the lower pond. Mean total lengths were 271 mm and 284 mm. Maximum lengths were 485 mm and 495 mm, respectively.

Additional waters sampled included Bray Lake, Rupert and Emerald gravel ponds, and Anderson Ranch, Oakley, and Salmon Falls Creek reservoirs.

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OBJECTIVES

To maintain information for fishery management activities and decisions for lowland lakes and reservoirs.

METHODS

Kokanee Oncorhynchus nerka kennerlyi abundance and age structure were estimated in Anderson Ranch Reservoir during 1990 using nighttime midwater trawling (Rieman 1992). Methodology for the trawling and data analysis was the same as used in 1989. Kokanee trend counts were made weekly during the spawning run on the South Fork Boise River.

General fishery data in lakes and reservoirs were collected with standard gear, including a Smith-Root Model SR-18 electrofishing boat with a Model 5.0 pulsator and/or a drift boat equipped with a Coffelt VVP-15 electrofisher powered by a Honda 5000 generator, variable (19 mm to 64 mm square mesh) 38 m by 1.8 m gill nets, trap nets, and 15.2 m (6.2 mm square mesh) beach seines. Fish collected were identified to species, and total length (mm) was measured on all game species and some nongame species. Population estimates were made in some areas using an adjusted (Chapman) Petersen mark-recapture estimate (Ricker 1975).

RESULTS AND DISCUSSION

Anderson Ranch Reservoir

Kokanee Abundance

As in 1990, low water levels in Anderson Ranch Reservoir restricted trawling for kokanee to the lower third of the reservoir. Five standard trawls were made in the lower reservoir (Fall Creek to dam). Estimates of the kokanee population in this portion of the reservoir on August 6, 1991 showed low numbers (7,515) of age 0 kokanee and slightly higher numbers (10,521 each) of age 1 and age 2 kokanee (Table 1). Densities in the kokanee layer were estimated to be 26/surface hectare for age 0 and 37/hectare for age 1 and 2. The biomass estimate was 1.8 kg/hectare with a correction to late September of 2.4 kg/hectare (Rieman 1992). Rieman and Myers (1991) estimated that the potential for the reservoir is near 28 kg/hectare, based on Chlorophyll 'a' and Secchi transparency.

While incidental sampling in the upper portion of the reservoir in 1990 showed kokanee in densities similar to the lower portion (Partridge and Corsi 1993), it is unlikely that many kokanee remained in the upper two-thirds of the reservoir in 1991, due to lower water levels, warm water, and low dissolved oxygen levels.

Only 38 kokanee and 1 hatchery rainbow trout O. mykiss (180 mm) were sampled in the five trawls. No fall chinook salmon O. tshawytscha were sampled in 1991. Kokanee lengths ranged from 40 mm to 190 mm (Table 2). The sample probably included both wild and hatchery released kokanee. A total of 353,000 early spawning kokanee fry (1,954 kg) were released in the South Fork Boise River just above the reservoir on May 6 and 7, 1991. These stocked fry ranged from 72 mm to 110 mm, with a mean length of 90.8 mm.

Table 1. Kokanee population estimates for the lower third of Anderson Ranch Reservoir on August 6, 1991 and August 15, 1990. Ninety-five percent confidence limits are in parentheses.

Year	Age Class			Total
	0+	1+	2+	
1990	433,061	5,468	867	439,396
	(107,354	(5,778)	(1,699	(107,550
Number/ha	921	12	2	1,255
1991	7,515	10,521	10,52	28,557
	(4,034)	(6,198)	(8,765	(11,468)
Number/ha	26	37	37	100

Table 2. Length frequency of kokanee collected by trawling Anderson Ranch Reservoir on August 6, 1991 and of kokanee released into the reservoir on May 6 and 7, 1991.

Total length (mm)	Trawl	Stocked
40	1	
50	6	
60	3	
70		7
80	1	32
90		45
100	2	11
110	5	5
120	4	
130	2	
140	4	
150	2	
160	4	
170	3	
180		
190	1	
200		
210		
220		
230		
240		
250		
260		
270		
280		
290		
300		
310		
320		
330		
340		
350		
360		
370		
380		
390		
400		
Total	38	100
Mean	118	91

Dissolved oxygen and temperature profiles taken at three sites on August 7, 1991 in Anderson Ranch Reservoir showed temperatures exceeding 20°C within three meters of the bottom near Curlew Boat Ramp in the upper end of the reservoir (Figure 1). In the middle and lower sites, a distinct thermocline developed at 10 m to 12 m with high temperatures and low dissolved oxygen reducing salmonid habitat in the upper portion of the reservoir. Depth at the lower site exceeded the 30 m probe. According to U.S. Geological Survey (USGS) records, Anderson Ranch Reservoir had 168,900 acre ft of water on August 6, 1991, compared to 223,900 acre ft on August 15, 1990.

Kokanee Spawning

Kokanee spawning ground and holding area counts were conducted weekly in the South Fork Boise River from August 29 to October 1, 1991. Sites were the same as in 1990. No kokanee were observed at any of the count sites throughout 1991 (Figure 2). Approximately 50 kokanee from Deadwood Reservoir plants were observed at the confluence of Big and Little Smokey creeks on September 13, 1991. Possible reasons for the lack of kokanee include an extremely small or missing year class and/or possible blockage of kokanee movement from the reservoir due to shallow flows across the mud flats as the reservoir level dropped.

Bray Lake

Due to drought conditions, Bray Lake dried up in 1991. A beach seine salvage operation conducted on August 14, 1991 captured 180 channel catfish Ictalurus punctatus which were then transported to Dog Creek Reservoir. Lengths taken on 22 of the fish showed a range of 320 mm to 430 mm, with a mean of 368 mm, essentially the same as found in 1990 (365 mm) (Partridge and Corsi 1993).

Bruneau Sand Dunes Ponds

The Bruneau Sand Dunes Ponds are two ponds located at the base of the large sand dune in Bruneau Sand Dunes State Park, 25 km south of Mountain Home, Idaho. The ponds lie at an elevation of 754 m. The ponds developed following the start of irrigation on adjacent lands in the early 1950s and a successful largemouth bass Micropterus salmoides and bluegill Lepomis macrochirus fishery was established in the two main ponds. With the change of irrigation practices from flood to sprinkler irrigation in the early 1980s, water levels in the ponds began to drop, resulting in fish kills. A joint project between the Idaho Department of Parks and Recreation and the Idaho Department of Fish and Game (IDFG) installed a pump system from the Snake River to the ponds in 1987 (Horton 1990). With pond levels again stabilized, fish populations in the ponds began to rebuild. Current regulations allow for unlimited harvest of bluegill and the harvest of two largemouth bass of 356 mm or greater.

In April 1991, efforts were made to determine population data from both ponds in conjunction with a statewide largemouth bass research project. Two electrofishing boats were used at night to conduct a modified (Chapman) Petersen mark/recapture estimate for both largemouth bass and bluegill. Fish (>150 mm) were marked on April 18 and recaptured on April 25, 1991. Due to the inability to sample sufficient fish from the lower pond, 45 largemouth bass were transferred from the upper pond in an attempt to provide enough marked fish in the lower pond. This was not successful, so population estimates were only made on the upper pond (Table 3). Based on the USGS revised topographic map and current pond levels, the area of the two ponds was estimated to be 12 hectare for the smaller upper pond and 32 hectare for the lower pond.

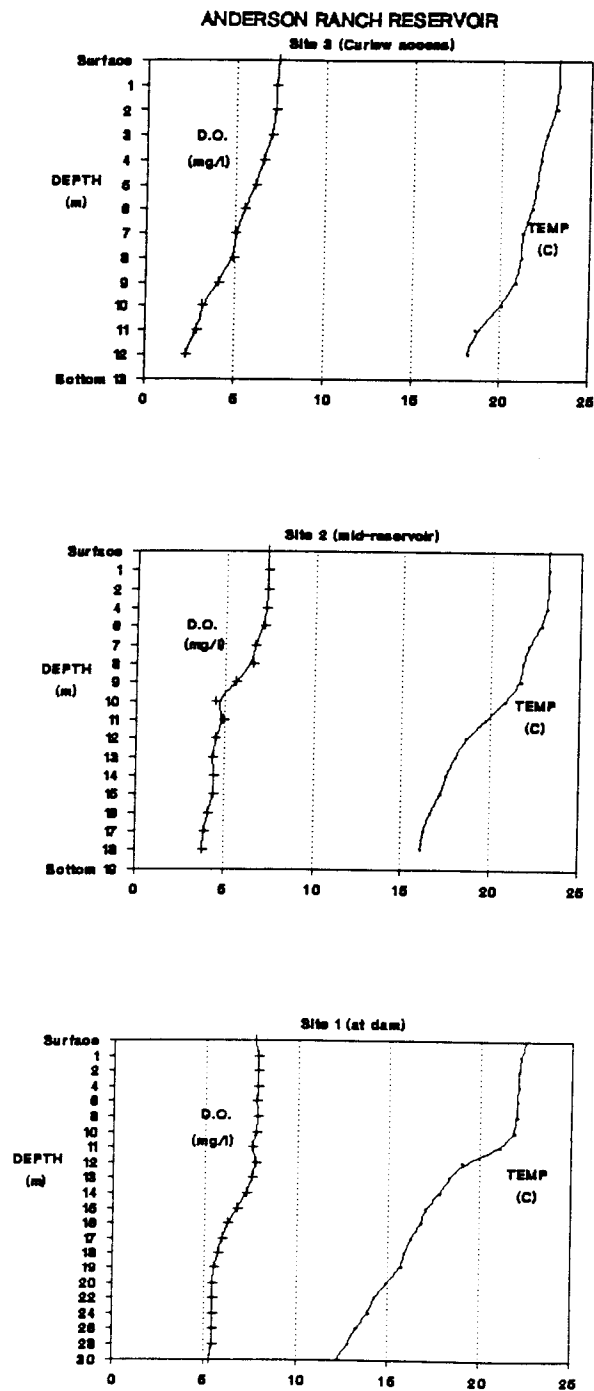


Figure 1. Temperature and dissolved oxygen profiles in Anderson Ranch Reservoir on August 7, 1991.

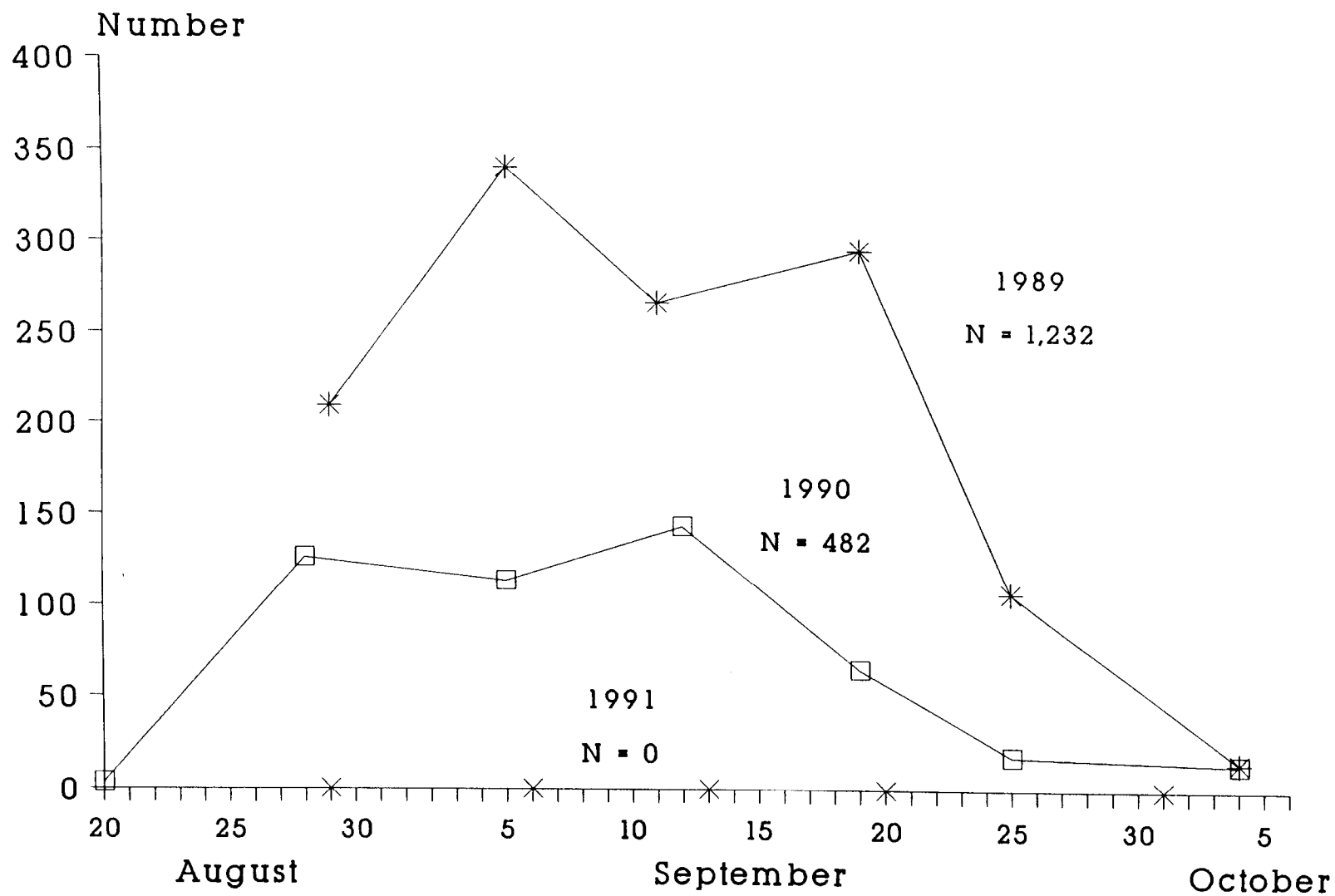


Figure 2. Counts of spawning kokanee in trend areas above Anderson Ranch Reservoir in the South Fork Boise River during 1989-91.

Table 3. Bluegill and largemouth bass population estimates in the upper Bruneau Sand Dunes pond in April 1991.

Species	Marked	Caught	Recaptured	Population estimate	Standard error	Density No/ha
Bluegill ≥ 150 mm	206	128	9	2,670	773	222
Largemouth bass 150-299 mm	116	104	16	723	156	60
Largemouth bass ≥ 300 mm	23	31	10	70	16	6
Total bass				793	157	66

A population of 2,670 bluegill of 150 mm or greater was estimated for the upper Bruneau Sand Dunes Pond (Table 3). The density estimate was 222/hectare. The largemouth bass population estimate was 793 for fish of 150 mm or greater (66/hectare). A total of 27 bluegill and 44 largemouth bass were sampled in two runs in the lower pond. Additional fish sampled included a limited number of adult common carp Cyprinus carpio, which were removed.

Largemouth bass from 60 mm to 470 mm (mean = 270 mm) were sampled in the upper pond (Figure 3). The proportional stock density (PSD) for largemouth bass was 18, with 12% exceeding minimum harvestable size (356 mm or 14 inches). In the lower pond, largemouth bass ranged from 240 mm to 470 mm, with a mean length of 339 mm. PSD was 64, with 57% being of legally harvestable size. Bluegill in the upper pond ranged from 40 mm to 230 mm, with a mean length of 172 mm (Figure 4). Bluegill PSD was 88. In the lower pond, the bluegill sampled ranged from 190 mm to 260 mm, with a mean of 230 mm and a PSD of 100.

Angler Questionnaire

A questionnaire was developed for the Bruneau Sand Dunes Ponds to collect angler opinions on the direction of management for the area. Questionnaires were given to anglers at the park and at public meetings discussing regional fishing regulations. Additionally, a copy of the questionnaire was printed in a Boise newspaper fishing column. Responses to the questionnaire showed a preference for managing both of the ponds for larger bass (56% to 88%) and the preferred regulation was a trophy regulation of two bass, none under 508 mm (Appendix A).

Dierkes Lake

Dierkes Lake is a 10.0 hectare lake located 5 km northeast of Twin Falls, Idaho. It sits on the south side of the Snake River in the canyon breaks at an elevation of 1,082 m. Historically, it was an empty basin and was used as an orchard when the area was first settled by pioneers. With the development of irrigated lands above the canyon rim in the early 1900s, the ground water level in the area rose and created numerous springs along the rim which flooded the basin and created Dierkes Lake. Currently the area is within the Twin Falls City Parks system and the area receives heavy use from swimmers and anglers. Currently 3,500 harvestable sized rainbow trout are stocked in March and April.

Dissolved oxygen and temperature profiles taken at the west end of the lake in June and July showed suitable dissolved oxygen (> 6 mg/l) for both cold and warmwater fish; however, water temperatures became excessive (> 20°C) for trout in July (Figure 5). Water chemistry measured near both ends of the lake showed that alkalinity ranged from 204 to 213 mg/l, hardness 197 to 210 mg/l, and conductivity 700 to 800 μ mhos/cm during June and July.

Dierkes Lake fish populations were sampled the night of July 24, 1991, using the Smith-Root electrofishing boat. Of all fish collected during a 15 minute (11.25 minutes on time) sample, 23 (11.8%) were largemouth bass and 172 (88.2%) were bluegill. An additional 85 largemouth bass were sampled in 35.55 minutes of shocking time. No trout were sampled.

Excluding 108 young-of-the-year bluegill not measured, bluegill ranged from 45 mm to 160 mm, with a mean length of 90 mm (Figure 6). PSD for bluegill was calculated at four. Largemouth bass sampled ranged from 70 mm to 470 mm, with a mean of 238 mm. Fifteen (14%) of the bass exceeded 305 mm. PSD for largemouth bass was 24. A sample of nine of the larger largemouth bass found ages up to 8 years of age (Table 4).

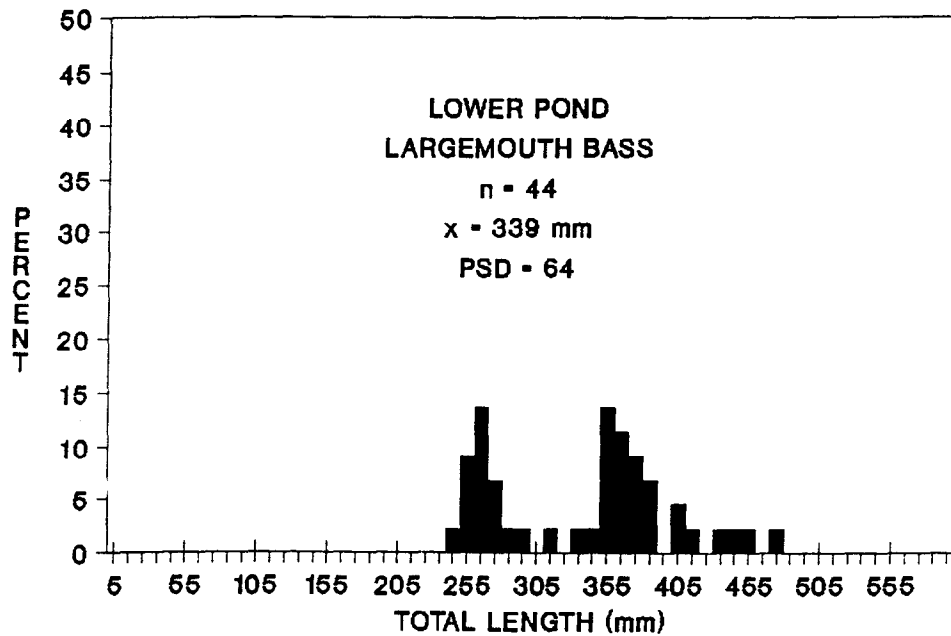
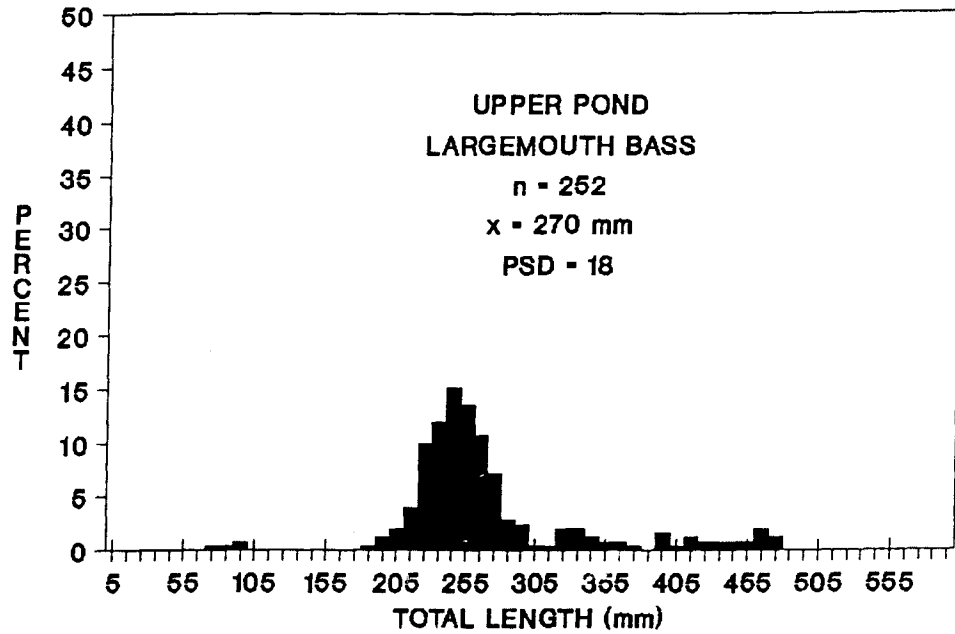


Figure 3. Length frequency of largemouth bass sampled by electrofishing in the Bruneau Sand Dunes Ponds during April 1991.

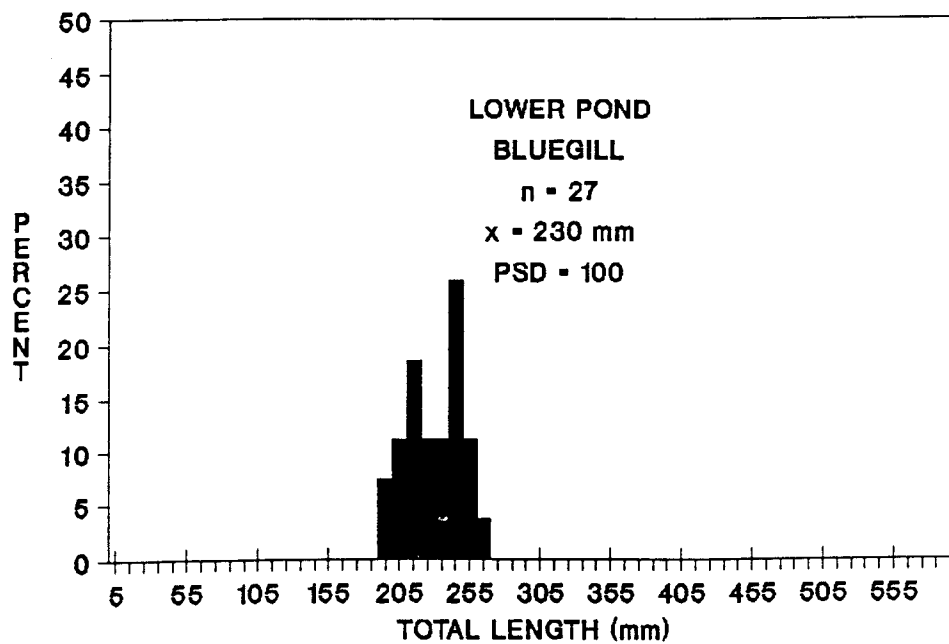
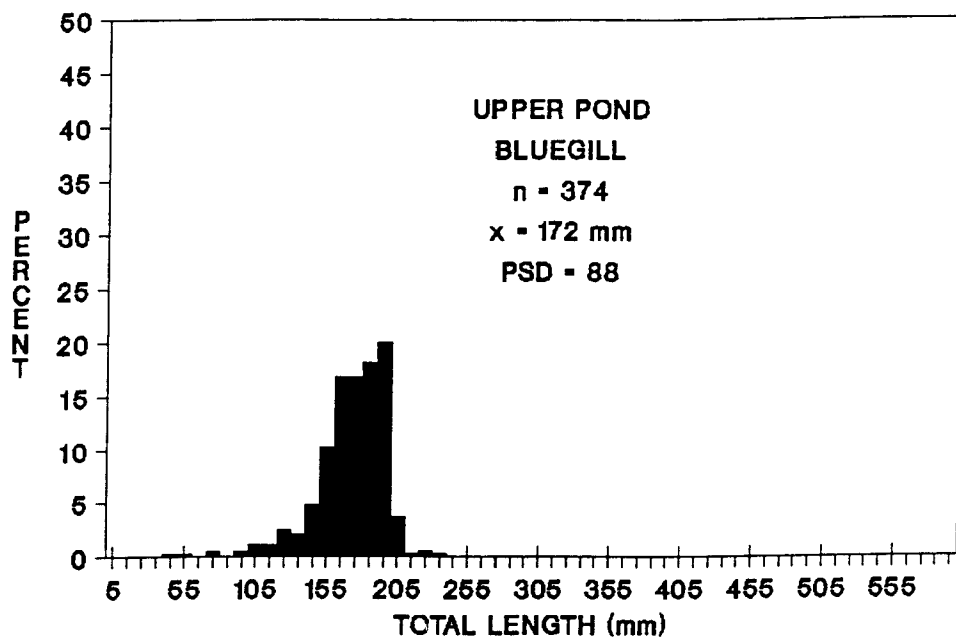


Figure 4. Length frequency of bluegill sampled by electrofishing in the Bruneau Sand Dunes Ponds during April 1991.

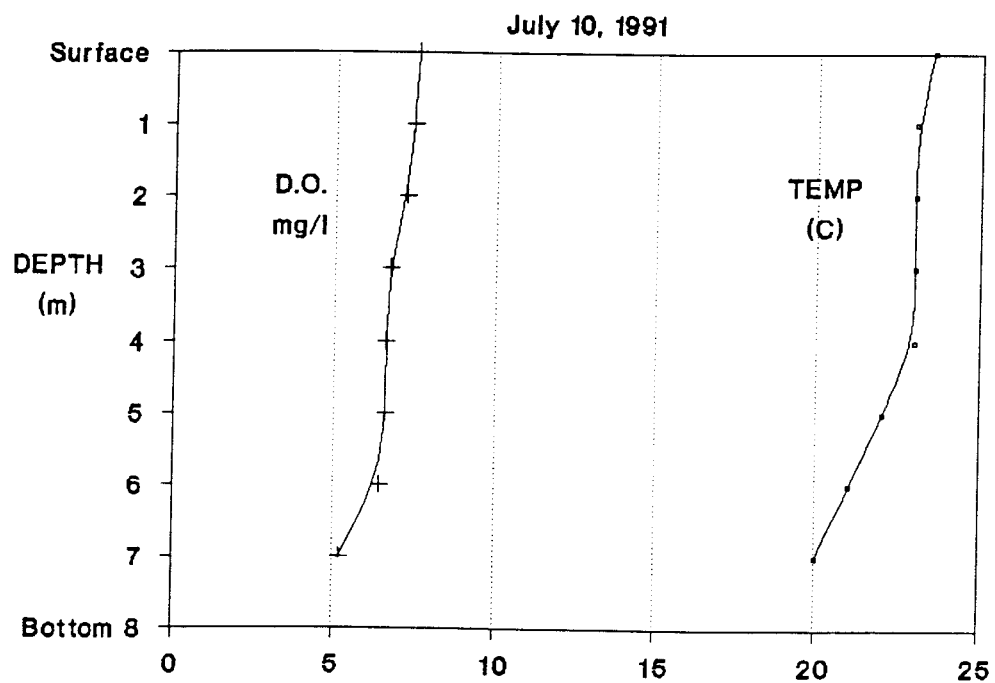
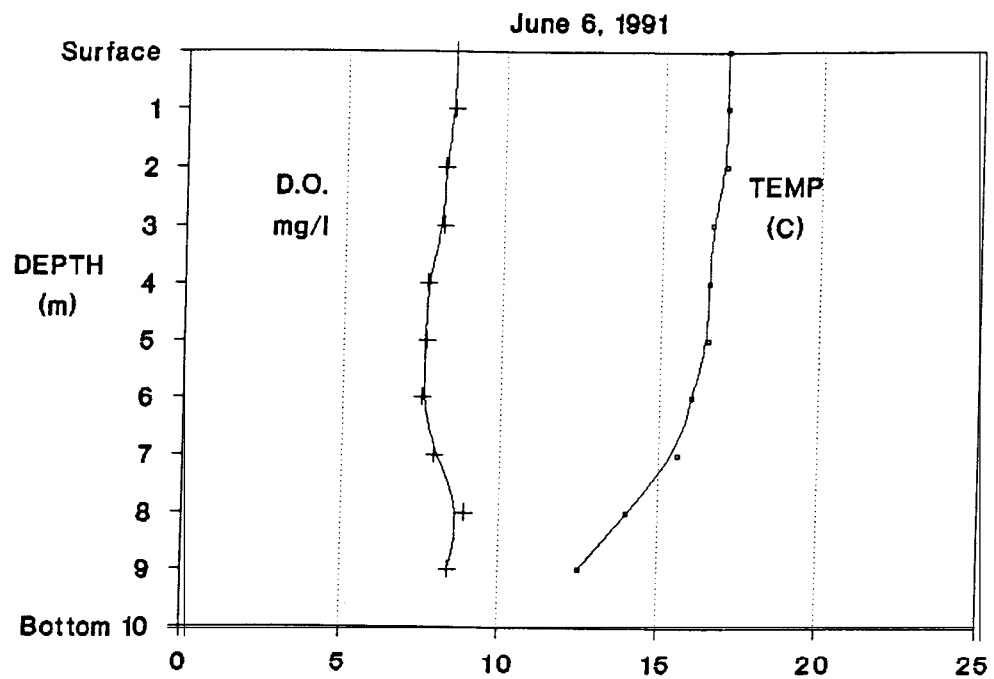


Figure 5. Temperature and dissolved oxygen profiles in Dierke's Lake during June and July 1991.

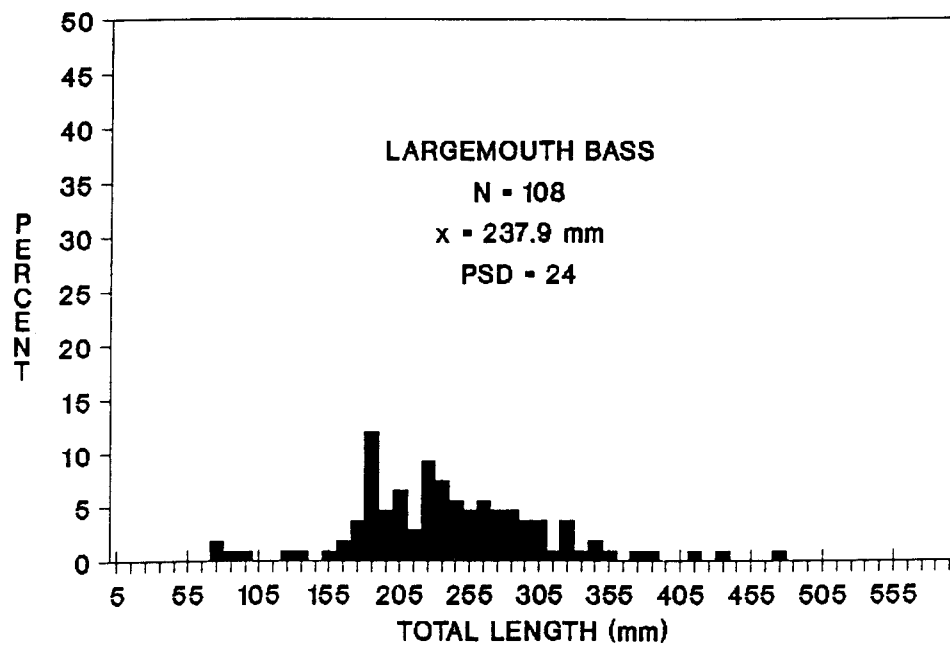
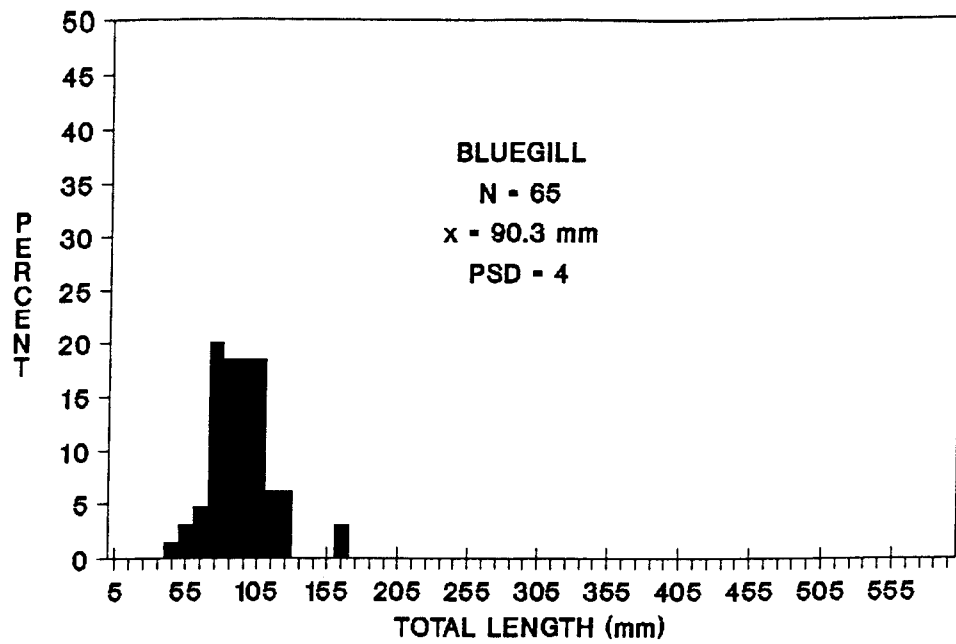


Figure 6. Length frequencies of bluegill and largemouth bass sampled by electrofishing in Dierke's Lake during July 1991.

Table 4. Back calculated length at age (mm) for largemouth bass collected in Dierkes Lake on July 24, 1991. Standard deviation is in parentheses.

Year class	Number of fish	Mean length at annulus							
		1	2	3	4	5	6	7	8
1987	4	56 (7.1)	11 (3.6)	168 (11.1)	283 (17.3)				
1986	2	51 (7.2)	85 (6.2)	136 (29.5)	211 (65.2)	271 (29.9)			
1985	2	70 (18.1)	11 (13.4)	174 (40.0)	260 (8.8)	309 (9.0)	343 (6.8)		
1984	0								
1983	1	57 (-)	89 (-)	122 (-)	218 (-)	305 (-)	348 (-)	376 (-)	396 (-)
Weighted average length		58 (11.0)	10 (14.1)	157 (27.4)	237 (31.8)	293 (25.7)	344 (5.7)	376 (-)	396 (-)

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Emerald Lake

Emerald Lake is a 12 hectare gravel pit pond located along Interstate 84 northeast of Burley, Idaho. Maximum depth was measured at 2.9 m, with a mean depth of 2.0 m. Water for the pond is primarily from ground water and some flows from irrigation canals. The pond area is managed as a park by Minidoka County. IDFG stocks 11,000 catchable rainbow trout per year in the pond and occasionally brood stock in the spring and fall months.

A night electrofishing sample with the Smith-Root boat was conducted on June 21, 1991 at Emerald Lake. A total of 14 (5.3%) largemouth bass, 6 {2.3%} hatchery rainbow trout, 1 (0.4%) channel catfish, 21 (8.0%) yellow perch *Perca flavescens*, 189 (71.9%) Utah sucker *Catostomus ardens*, 23 (8.8%) Utah chub *Gila atraria*, and 9 {3.4%} common carp were sampled during 34 minutes (on time) of electrofishing. During an additional 14 minutes of sampling for game fish, nine additional hatchery rainbow trout were collected.

The channel catfish sampled was 610 mm long and weighed 2.8 kg. Hatchery rainbow trout averaged 269 mm, largemouth bass 122 mm, and yellow perch 105 mm (Table 5).

Water temperatures (22°C) during July were at the upper limits for trout, but had cooled to acceptable levels by September (Figure 7). Dissolved oxygen levels were good (>6 mg/l) during both July and September.

Lower Salmon Falls Reservoir

Lower Salmon Falls Reservoir is a hydropower reservoir which was first constructed on the Snake River near Hagerman, Idaho in 1907 at the site of a natural falls. A larger dam was constructed in 1949, impounding water upstream for 11 km. Surface area of the reservoir is approximately 340 hectare and the maximum depth is approximately 12 m (Grunder et al. 1987). The reservoir is primarily a run-of-the-river reservoir; however, during low water years, Idaho Power Company does fluctuate water levels about one meter per day to provide some peak power production (Partridge and Corsi 1993). During water year 1991, 4.3 million acre ft of water passed through the reservoir (Harenberg et al. 1991). Based on this flow, the exchange rate for the reservoir is 1.5 days. Mid-day water temperature and dissolved oxygen levels were sampled once a month from June through September 1991. Due to flows and mixing in the reservoir, no thermocline developed. Water temperatures were highest in July at 22°C (Figure 8).

The reservoir fish population is dominated by nongame species such as common carp and largescale sucker *C. macrocheilus*, but does provide a good seasonal fishery for largemouth bass and put-and-grow trout. The reservoir trout fishery is normally best during fall through spring months due to cooler water, less aquatic vegetation, and better water quality. During 1991, 57,000 trout were stocked in the reservoir (Table 6). Additionally, an evaluation of the success of these releases and the reservoir fishery was started in December 1990.

Species Composition

In July 1991, fish populations in Lower Salmon Falls Reservoir were sampled using both night time electrofishing from the Smith-Root boat and sinking and floating gill nets (Figure 9). Five sites were electrofished with each site consisting of 15 minutes of sampling all species and 30 minutes of sampling just game fish. Shocking time averaged about 75% of the sampling time. Each of the four overnight gill net sites consisted of one floating and one sinking multimesh sampling gill net.

Table 5. Length frequency of fish sampled by electrofishing in Emerald Lake on June 21, 1991.

Total Length (mm)	Hatchery rainbow trout	Largemouth bass	Channel catfish	Yellow perch	Utah sucker	Utah chub	Common carp
60							
70						1	
80					3	1	
90				5	9	6	
100		1		7	11	1	
110		3		7	15		
120		6		2	8		
130		4					
140							
150							
160						1	
170						1	
180							
190							
200	3						
210						1	
220	1				3		
230					4		
240	2				1	1	
250	4						
260	2						
270							
280	1						
290	1						
300							
310							
320							
330					3		
340					2		
350							
360							
370							
380							
390							
400							
410							
420							
430							
440							
450							1
460							
470							
480							
490							
500							

Total Length (mm)	Hatchery rainbow trout	Largemouth bass	Channel catfish	Yellow perch	Utah sucker	Utah chub	Common carp
510						1	
520						1	
530						1	1
540							
550							
560							
570							
580							1
590	1						1
600							
610			1				
620							
630							1
640							
650							
660							1
670							
680							
690							
700							
Total	15	14	1	21	62	13	6
Mean	269	122	610	105	161	122	577

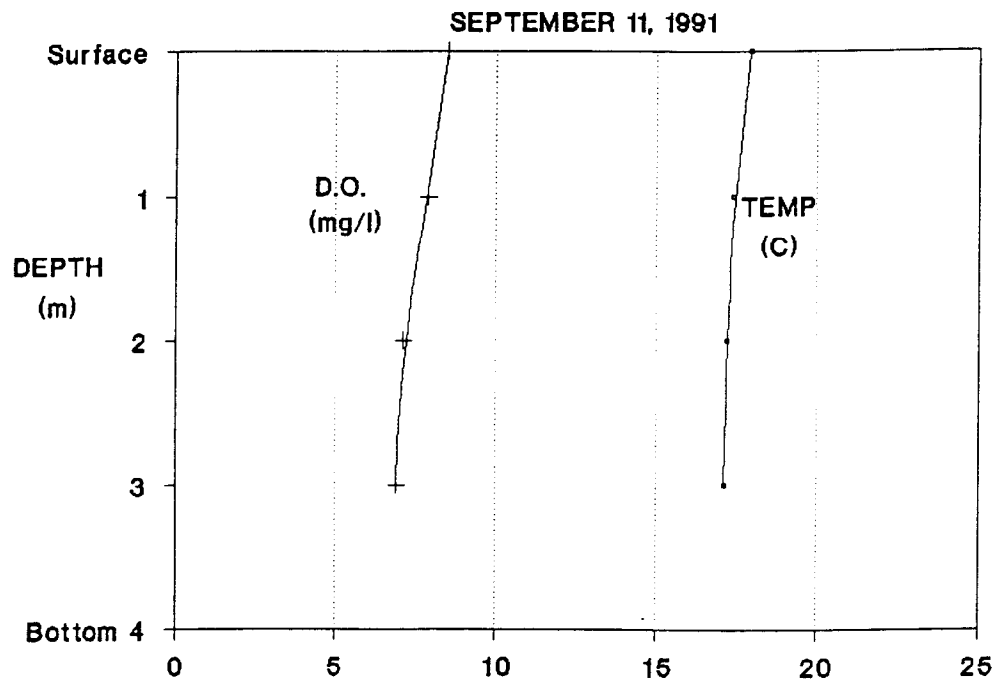
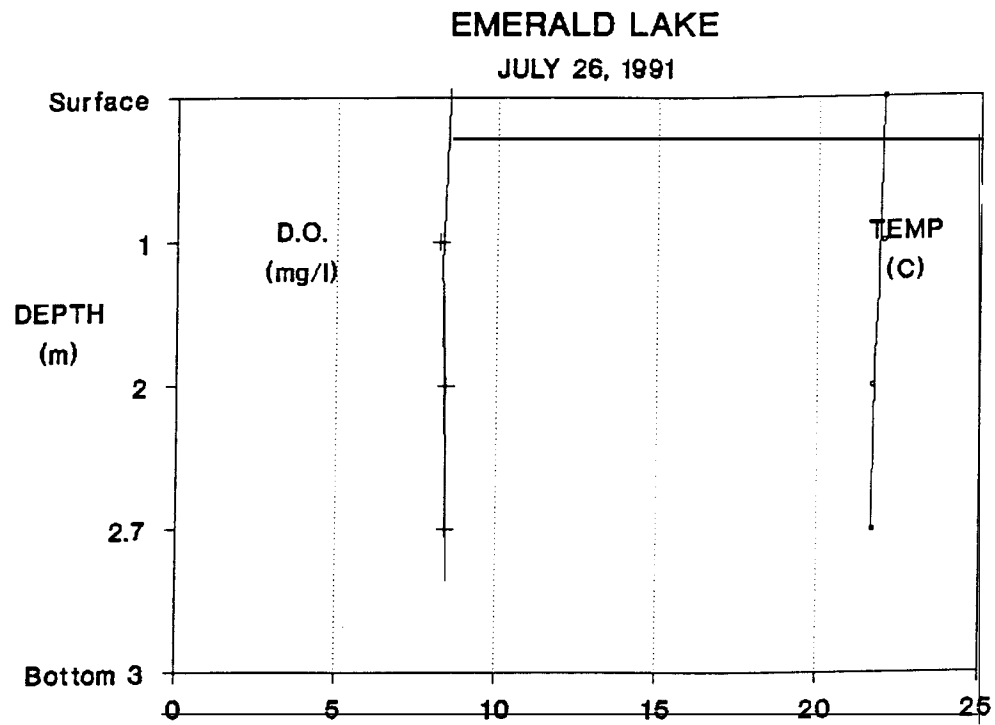


Figure 7. Temperature and dissolved oxygen profiles in Emerald Lake during July and September 1991.

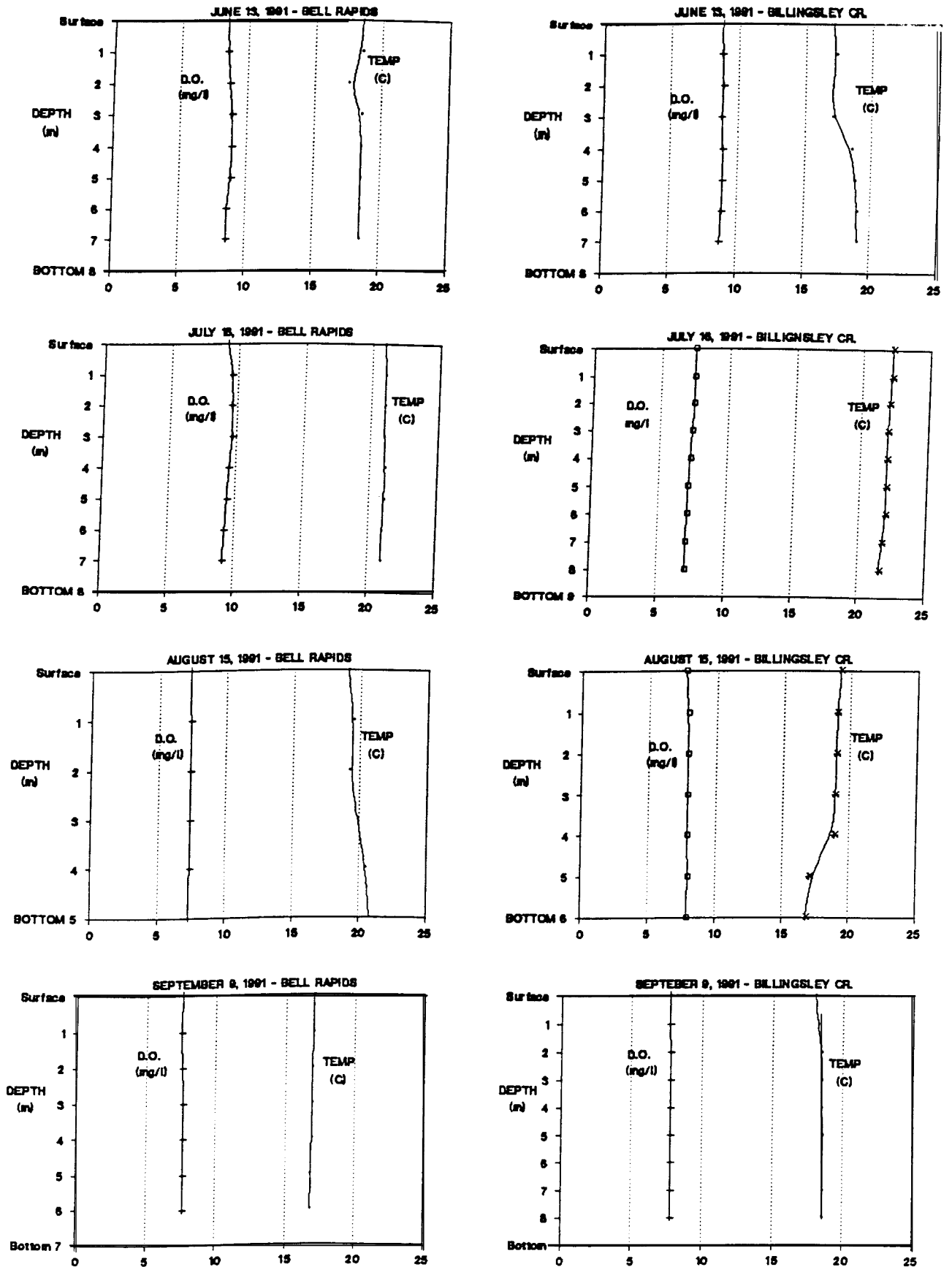


Figure 8. Temperature and dissolved oxygen profiles in Lower Salmon Falls Reservoir during July through September 1991.

Table 6. Number and tag types of fish stocked in Lower Salmon Falls Reservoir during 1991.

Species strain	Date	Number	Number/kg	Length (mm)	Mark
Rainbow trout Hayspur	02/21	15,477	10.2	206 (182) ^a	All AD 2,000 BN-0
Brown trout	05/15	10,030	137.0	86	
Rainbow trout Erwin	05/22	11,900	11.7	198 (185) ^a	1,000 BN-1 300 JAW TAG
Rainbow trout Hayspur	09/12	15,100	7.2	231 (240) ^a	1,000 BN-2
Cutthroat trout Fine spot	12/13	4,839	278	68	

^a Mean length of sample of 100 fish. Other length values converted from weight tables.

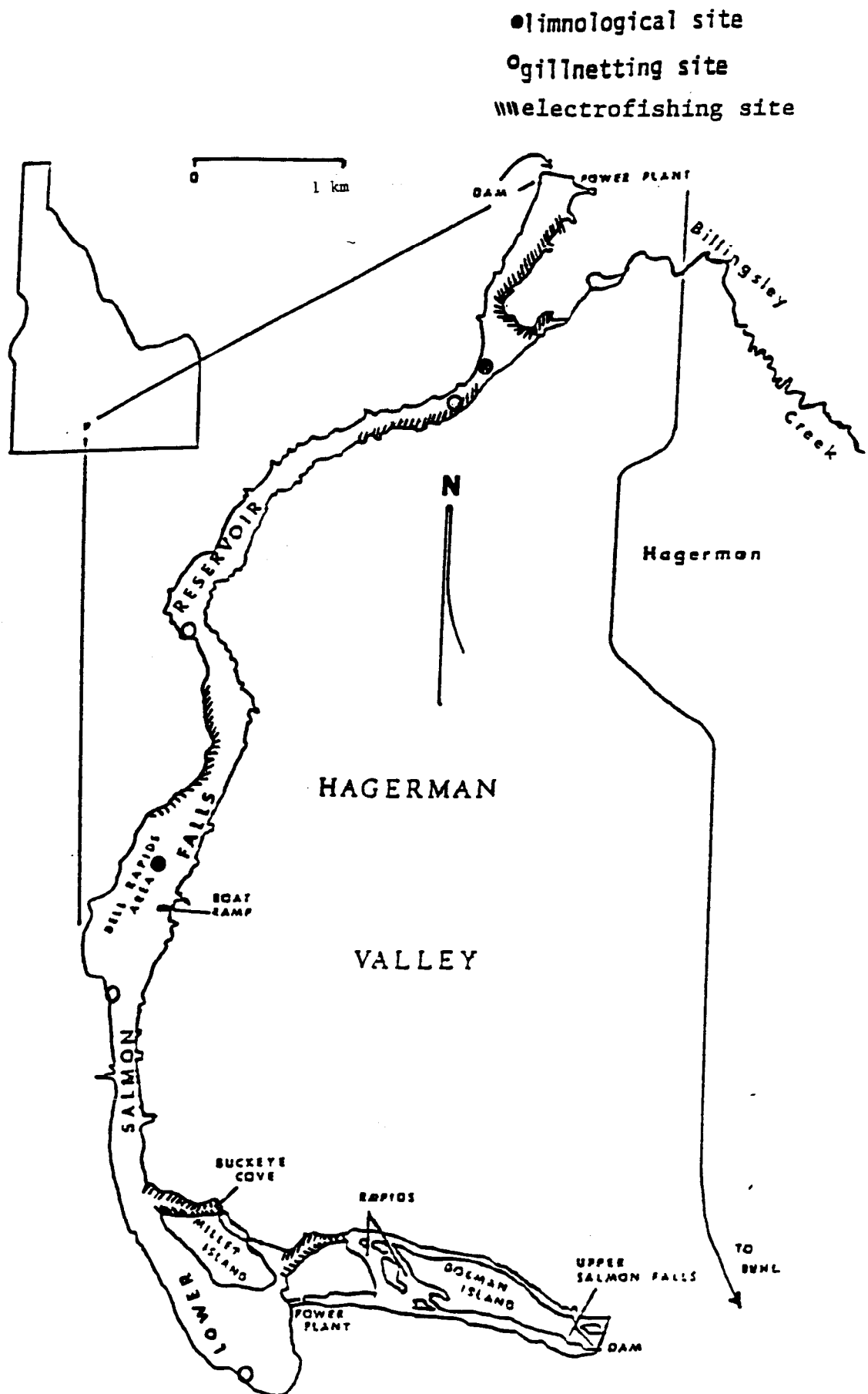


Figure 9. Location of sampling sites used in Lower Salmon Falls Reservoir during 1991.

Game fish consisting of rainbow trout, brown trout Salmo trutta, mountain whitefish Prosopium williamsoni, largemouth bass, smallmouth bass Micropterus dolomieu, brown bullhead Ictalurus nebulosus, bluegill, and yellow perch were sampled in Lower Salmon Falls Reservoir (Table 7). When sampling all species by electrofishing, game species accounted for 17% of the sample. Twelve percent of gill net samples were game fish. Bluegill, the most numerous game species, accounted for 42% of game fish, followed by largemouth bass (30%) and rainbow trout (14%). Nongame fish sampled included chiselmouth Acrocheilus alutaceus, common carp, dace Rhinichthys sp., largescale sucker, mottled sculpin Cottus bairdi, northern squawfish Ptychocheilus oregonensis, peamouth chub Mylocheilus caurinus, Utah chub, and redbreast shiner Richardsonius balteatus.

Largemouth bass ranged from 110 mm to 445 mm, with a mean of 286 mm (Table 8). The PSD for largemouth bass was 62 and the mean relative weight was 112. Bluegill sampled were up to 230 mm and had a PSD of 75. Of four brown trout sampled, two (130 mm and 135 mm) were from hatchery releases in May. The other two were mature fish at 560 mm, 2.4 kg and 590 mm, 2.45 kg. The 19 rainbow trout sampled ranged from 150 mm to 505 mm, with a mean of 316 mm. Five (26%) rainbow trout were adipose fin-clipped from a February release. These five averaged 307 mm, compared to 182 mm when released, or an average growth of 25 mm per month. The mean condition (K) for rainbow trout was 1.054. Nongame fish lengths are presented in Table 9.

Angler Survey

An angler creel survey was begun on Lower Salmon Falls Reservoir in December 1990 and continued through November 1991. Six random dates (3 weekend and 3 week days) were selected each month to survey the reservoir; however, due to limited personnel, some counts were not conducted during the first 6 months. Vehicle counts were made at the three main access points on the reservoir and multiplied by two anglers per vehicle to determine angler effort. Adjustments were made to vehicle counts for hunters and non-fishing boaters during angler interviews at boat ramps. The actual average anglers per party during the course of the survey was 2.05. In addition to interviewing anglers, larger stocked fish were marked with fin clips, jaw tags, and T-bar anchor tags to provide additional harvest information (Table 6). Tag boxes for voluntary returns of unmarked anchor tags were placed at the three main access points.

During December 1990 - November 1991, anglers fished an estimated 43,626 hours (128 hours/hectare or 51 hours/acre) on Lower Salmon Reservoir (Table 10). The three highest months of fishing effort were May, June, and January; however, limited angler counts during March and April could have resulted in a low estimate of effort. Anglers caught an estimated 12,400 fish and harvested 9,600 fish (28/hectare or 11/acre) from the reservoir during this period (Table 11). Rainbow trout accounted for 59% of the harvest, followed by bluegill 28%, and yellow perch 10%. Estimates of largemouth bass harvest (75) appeared lower than expected and may have resulted from insufficient contacts during evening and morning hours.

Marked rainbow trout (Hayspur strain) stocked as large fingerlings in Lower Salmon Falls Reservoir in February 1991 immediately began to be harvested. These accounted for 24% (930) of rainbow trout harvested from release until the end of November 1991, but only 4% (98) after June 1, 1991. Voluntary returns of brown anchor tags did not prove successful. Tag boxes were vandalized and most anglers did not read the display at the boxes. A total of 21 (1.05%) tags from the February release were turned in. The May release of Erwin rainbow trout was supposed to be fish of harvestable size; however, this group suffered several disease problems at the hatchery and were undersize and in poor health. As a result, no marked fish were seen in the creel nor were any anchor tags turned in. One (0.3%) jaw tag was returned from this release. Tag returns were best from the September release (Hayspur), with 19 (1.90%) tags dropped in the boxes by the end of November. Also, estimated harvest of marked fish during September-November was 19. After population sampling the Snake River below the reservoir in June 1991, it was estimated that 195 Hayspur (1.3% of marked release) and 32 Erwin (2.5%) survived emigrating from the reservoir (see Job 4-c, this report).

Table 7. Species composition of fish sampled in Lower Salmon Falls Reservoir in July 1991.

Species	Electrofishing		Gill netting		Electrofishing	
	All species				Game fish only	
	Number	Percent	Number	Percent	Number	Percent
Rainbow trout	2	0.99	8	4.40	9	11.84
Brown trout	2	0.99	2	1.10	0	0.00
Mountain whitefish	0	0.00	2	1.10	0	0.00
Largemouth bass	18	8.91	4	4.40	17	22.37
Smallmouth bass	2	0.99	0	0.00	0	0.00
Brown bullhead	0	0.00	0	0.00	1	1.32
Bluegill	10	4.95	1	0.55	44	57.89
Yellow perch	0	0.00	4	2.20	5	6.58
Game fish total	(34)	(16.83)	(21)	(11.80)	(76)	(100.00)
Chiselmouth	1	0.50	0	0.00		
Common carp	51	25.25	12	6.59		
Dace sp.	1	0.50	0	0.00		
Largescale sucker	96	47.52	72	39.56		
Mottled sculpin	2	0.99	0	0.00		
Northern squawfish	3	1.48	14	7.69		
Peamouth chub	3	1.48	0	0.00		
Utah chub	9	4.46	59	32.42		
Redside shiner	2	0.99	0	0.00		
Nongame fish total	(168)	(83.17)	(157)	(88.20)		

Table 8. Length frequency of game fish sampled in Lower Salmon Falls Reservoir during July 1991.

Total length (mm)	Bluegill	Largemouth bass	Smallmouth bass	Yellow perch	Brown bullhead	Rainbow trout	Brown trout	Mountain whitefish
50	3							
60								
70								
80	1							
90	1							
100								
110	1	3						
120	2							
130	3	1					2	
140	5							
150	7	2		2		1		
160	12							
170	10			1				
180	1							
190								
200	2			1				
210	2	3				1		
220	4	2				1		
230	1	1						
240				1				
250		1		2				
260		2						
270		2				2		
280		1			1			
290		2		1		2		
300		5				1		1
310		4		1				
320		1				5		
330		3				2		1
340								
350								
360		1	1			1		
370		3						
380								
390		2						
400								
410		2	1			1		
420		1				1		
430								
440		1						
450								
460								
470								
480								
490								
500						1		

Table 8 continued.

Total length (mm)	Bluegill	Largemouth bass	Smallmouth bass	Yellow perch	Brown bullhead	Rainbow trout	Brown trout	Mountain whitefish
510								
520								
530								
540								
550								
560							1	
570								
580								
590							1	
600								
Total	55	43	2	9	1	19	4	2
Mean	158	286	388	228	280	316	354	318

Table 9. Length frequency of nongame fish sampled in Lower Salmon Falls Reservoir during July 1991.

Total length (mm)	CRP ^a	LSS	UC	SQF	CHM	DAC	PMC	RSS	MSC
40		1						2	
50									
60									
70				1					
80			1			1	1		
90									
100				2					2
110									
120			1						
130									
140		1					1		
150					1				
160									
170									
180			1						
190									
200			1						
210		2	2						
220		1							
230									
240									
250			1						
260		1	1						
270							1		
280		2	5	1					
290			9	1					
300			8						
310			13						
320			9						
330			4						
340		1	6						
350			1						
360		3	1						
370	1		1	1					
380	1	1	1						
390	1	1		1					
400	4	1	1	2					
410		3							
420		2		5					
430		15							
440	2	9		1					
450	2	19		1					
460	4	15							
470	3	16		1					
480	4	22							
490	1	9							
500	2	7							

Table 9 continued.

Total length (mm)	CRP ^a	LSS	UC	SQF	CHM	DAC	PMC	RSS	MSC
510	1	9							
520	3	2		1					
530	1	3							
540	3	2							
550	1	4							
560	3	3							
570	4	4							
580	2	3							
590	2	3							
600	3	1							
610	1	1							
620	2	1		1					
630	1								
640									
650	2								
660	1								
670	1								
680	1								
690	2								
700	1								
710	1								
720	1								
750	1								
Total	63	168	68	18	1	1	3	2	2
Mean	543	466	304	365	150	80	163	42	102

^a CRP-Common carp, LSS-Largescale sucker, UC-Utah chub, SQF-Northern squawfish, CHM-Chiselmouth, DAC-Dace sp., PMC-Peamouth chub, RSS-Redside shiner, MSC-Mottled sculpin.

Table 10. Estimated angler effort (hours) on Lower Salmon Falls Reservoir during December 1990 - November 1991. Ninety-five percent confidence intervals are in parentheses.

Interval	Bank anglers		Boat anglers		Total	
December	467	(-)	1,409	(-)	1,876	(-)
January	2,525	(188)	5,049	(340)	7,574	(388)
February	1,273	(938)	1,876	(2,337)	3,149	(2,518)
March	475	(-)	1,901	(-)	2,376	(-)
April	1,325	(2,649)	0	(-)	1,325	(2,649)
May	920	(-)	9,862	(-)	10,783	(-)
June	1,824	(1,184)	6,232	(6,613)	8,056	(6,718)
July	679	(692)	3,750	(1,959)	4,429	(2,078)
August	306	(354)	1,207	(647)	1,514	(737)
September	375	(520)	417	(601)	792	(795)
October	443	(630)	987	(1,395)	1,429	(1,530)
November	108	(215)	215	(430)	323	(481)
Total	10,720	(3,264)	32,905	(7,486)	43,626	(8,167)

Table 11. Estimated number of fish harvested from Lower Salmon Falls Reservoir during December 1990 - November 1991.

Interval	Total fish caught	Total fish kept	Rainbow trout	Brown trout	Coho salmon	Largemouth bass	Bluegill	Yellow perch
December	809	704	687	0	18	0	0	0
95% C.I.	275	221	215	-	34	-	-	-
January	1,478	1,101	1,070	0	0	0	0	31
95% C.I.	922	689	687	-	-	-	-	62
February	1,373	573	573	0	0	0	0	0
95% C.I.	1,437	681	681	-	-	-	-	-
March	385	321	321	0	0	0	0	0
95% C.I.	405	351	351	-	-	-	-	-
April	637	637	588	49	0	0	0	0
95% C.I.	1,305	1,305	1,218	138	-	-	-	-
May	1,991	797	263	0	0	0	266	263
95% C.I.	1,209	737	358	-	-	-	525	362
June	3,428	3,278	804	0	0	75	1,751	654
95% C.I.	4,209	4,075	1,003	-	-	163	2,436	1,262
July	1,245	1,145	363	0	0	0	717	64
95% C.I.	1,198	1,232	500	-	-	-	1,116	140
August	511	511	511	0	0	0	0	0
95% C.I.	938	938	938	-	-	-	-	-
September	44	0	0	0	0	0	0	0
95% C.I.	106	-	-	-	-	-	-	-
October	361	361	361	0	0	0	0	0
95% C.I.	654	654	654	-	-	-	-	-
November	167	167	167	0	0	0	0	0
95% C.I.	262	262	262	-	-	-	-	-
Total	12,429	9,595	5,708	49	18	75	2,734	1,012
95% C.I.	5,182	4,781	2,313	138	34	163	2,731	1,322

Growth of marked hatchery rainbow trout was good with the mean sizes of the February release being 200 mm in March, 238 mm in April, 253 mm in May, and one observed in November was 405 mm.

Angler Questionnaire

Two angler questionnaires were used in 1991 to obtain angler preferences for management direction for the Lower Salmon Falls Reservoir area. One questionnaire was attached to a newsletter sent to 1,000 regional license buyers. Eighty-three people responded to this questionnaire, with 66% reporting that they fished the reservoir (Appendix B). Fifty-seven percent of the reservoir anglers fished mainly for trout, followed by 30% fishing for bass. Over 60% of the respondents favored managing Lower Salmon Falls Reservoir as a quality or trophy fishery, even if it meant reducing the number of trout in the limit or imposing size limits; however, 68% objected to prohibiting the use of bait.

A second more detailed questionnaire was given to anglers at the reservoir during the angler survey. Anglers were allowed to answer it at home and return it in the postage-paid envelopes provided. Eighty-eight percent of the respondents (N = 73) reported that they fished mainly for trout (Appendix C). A majority (81%) were not satisfied with the I-Trent fishery at the reservoir; low fish catch rates were perceived to be the major problem. Over half of the respondents supported managing the reservoir as a trophy fishery, even if it required lower limits and size limits on the fish; however, 64% objected to prohibiting the use of bait. Sixty percent of the anglers objected to the introduction of crappie if it would alter the other types of fishing.

Magic Reservoir

Magic Reservoir is an irrigation storage reservoir located on the Big Wood River in Blaine and Camas counties, Idaho (Partridge 1985). When full it has a surface area of 1,529 hectare and a volume of 236 cubic hectometers, or 192,000 acre-feet. However, since 1986 drought conditions in the region have prevented the reservoir from filling and, each summer from 1987 to the present, have resulted in the reservoir being drawn down to near minimum pool levels (3 cubic hectometers or 2,500 acre-feet estimated). Prior to drought conditions, the reservoir received 1.0 to 1.2 million rainbow trout fingerlings annually. Since 1987, fingerling releases have decreased to 400,000 and have been supplemented with 35,000 to 60,000 catchable rainbow trout.

On April 8-9, 1991, two overnight experimental gill net sets (one floating and one sinking) were made in Magic Reservoir to sample fish populations. One set was at the inlet near Lava Point and one on the east side about 200 m from the dam. The nets were fished for 78 hours total and caught 122 bridgelip sucker Catostomus columbianus (74.3%), 38 rainbow trout (23.2%), and 4 yellow perch (2.4%). Previous gill netting during summer and fall months in 1983-84 found yellow perch percentages ranging from 15% to 80% of the sample (Table 12) (Partridge 1985). Although sampling times and gear differences (vertical nets also used in 1983-84) preclude a valid comparison of catch per effort, the perch population was down markedly, presumably due to drought conditions.

The 38 rainbow trout caught included fish identified as hatchery fish (17) showing fin deformities and wild fish without obvious deformities. It is likely that some of the fish identified as wild trout were hatchery fish released as fingerlings. The total length of the rainbow trout ranged from 210 mm to 510 mm, with a mean of 375 mm for both wild and hatchery fish (Table 13). Rainbow trout were in good condition with a mean K-factor of 1.13, and the largest fish weighed 1.5 kg.

Table 12. Fish species composition of experimental gill net sets^a in Aagic Reservoir.

Date	Net hours	Rainbow trout		Brown trout		Yellow perch		Redside shiner		Bridgelip sucker	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
July 1983	354	187	20.8	5	0.6	134	14.9	350	38.9	224	24.9
October 1984	528	370	34.9	1	0.1	158	14.9	304	28.7	226	21.3
July 1984	312	158	4.5	4	0.1	2,824	80.5	172	4.9	350	10.0
April 1991	78	38	23.2	0	-	4	2.4	0	-	122	74.3

^a Includes both horizontal and verticle sets in 1983 and 1984 (Partridge 1985).

Table 13. Length frequency of measured fish sampled in gill nets in Magic Reservoir on April 9, 1991.

Total length (mm)	<u>Rainbow trout</u>		Yellow perch	Bridgelip sucker
	Hatchery	Wild		
130				
140			2	
150				
160				
170				
180				
190				1
200				1
210				3
220	1	1		9
230	1			4
240	1			2
250	2			2
260				2
270	1		1	2
280	1	1		
290	1			
300	2		1	
310	1			
320		2		
330				
340				
350		1		
360				
370		1		
380	3			1
390				
400				
410		2		
420		1		
430	2	1		
440	1	1		
450		3		
460		1		
470		1		
480		1		
490				
500		1		
510		3		
520				
Total	17	21	4	27
Mean	321	420	217	238

Niagara Springs Ponds

Niagara Springs Ponds are two artificial ponds located on the Niagara Springs Wildlife Management Area (WMA), 11 km south of Wendell in Gooding County, Idaho. The ponds are located adjacent to the Snake River at an elevation of 911 m. Water is supplied to the ponds by a diversion from Niagara Springs. The ponds were constructed in the early 1980s and a wild rainbow trout population established in the ponds from fish living in the diversion. Water flows from the diversion into the 2.0 hectare upper pond and through a culvert drop structure into the 1.6 hectare lower pond. Water also enters the lower pond directly from the diversion ditch. Trout in the upper pond can reenter the diversion ditch and spawn, while those in the lower pond are isolated from spawning gravels by the control structures. The ponds are relatively shallow with maximum depths being less than 2.0 m in the upper pond and less than 2.5 m in the lower pond. The upper pond is densely covered with submerged aquatic vegetation, while the lower pond is about 50% open water.

In June 1991, mark-recapture population estimates were made on the two ponds at night with a drift boat electrofisher. A total of 269 wild rainbow trout were sampled in the upper pond during the two nights of electrofishing, resulting in a population estimate of 913 fish (456/hectare) (Table 14). In the lower pond, 105 wild rainbow trout were sampled with an estimated population of 316 (198/hectare).

In the upper pond, fish sampled were from 68 mm to 485 mm, with a mean length of 271 mm (Figure 10). Thirty-three percent of the fish captured in the upper pond were 305 mm or larger, with 19% being over 380 mm. In the lower pond, fish ranged from 137 mm to 495 mm, with a mean of 284 mm. Twenty-six percent of the fish exceeded 305 mm and 13% were over 380 mm.

On March 5, 1991, approximately 200 m of the main diversion ditch at the upper pond inlet was electrofished to move spent wild rainbow trout from the ditch to the pond. A total of 55 fish were captured and moved, with 9 of the fish being spent females exceeding 320 mm in length. Other fish moved ranged from 100 mm to 215 mm.

Oakley Reservoir

On October 18, 1991, shoreline beach samples were taken in Oakley Reservoir to continue to monitor the spottail shiner Notropis hudsonius population which was introduced in 1989 (Partridge and Corsi 1990). Six seine hauls were taken, with four being on the southwest side below Trapper Creek and two near the dam. Only 24 fish were sampled, compared to 269 in 1990 and 147 in 1989 (Table 15). As in 1990 (52%), spottail shiner were the most numerous fish sampled (42%). Spottail shiner in the seines ranged from 38 mm to 60 mm and appeared to be young-of-the-year (Table 16). An additional sample of spottail shiner was collected in the outlet canal when water was shut off on September 30, 1991. These fish ranged from 42 mm to 90 mm and probably contained two year classes (Table 17). Rainbow trout in the outlet ranged from 105 mm to 365 mm, with both hatchery fingerlings and catchables being present.

One floating and one sinking gill net were set overnight (42 net hours) on October 17 and 18, 1991 in Oakley Reservoir to sample for walleye Stizostedion vitreum. A total of 24 walleye, 15 rainbow trout, and 113 sucker Catostomus sp. were sampled. Walleye ranged from 200 mm to 730 mm, with a mean of 242 mm (Table 18). Larger walleye were from a transplant of 110 prespawning walleye moved from Salmon Falls Creek Reservoir on April 2, 1990.

Table 14. Population estimates for wild rainbow trout in the Niagara Springs Wildlife Management Area ponds during June 1991.

Pond	Area (ha)	Number marked	Number caught	Number recaptured	Population estimate	S.E.	No./ha
Upper	2.0	81	166	14	913	218	456
Lower	1.6	27	78	6	316	107	198

Niagara Springs WMA

Wild rainbow trout

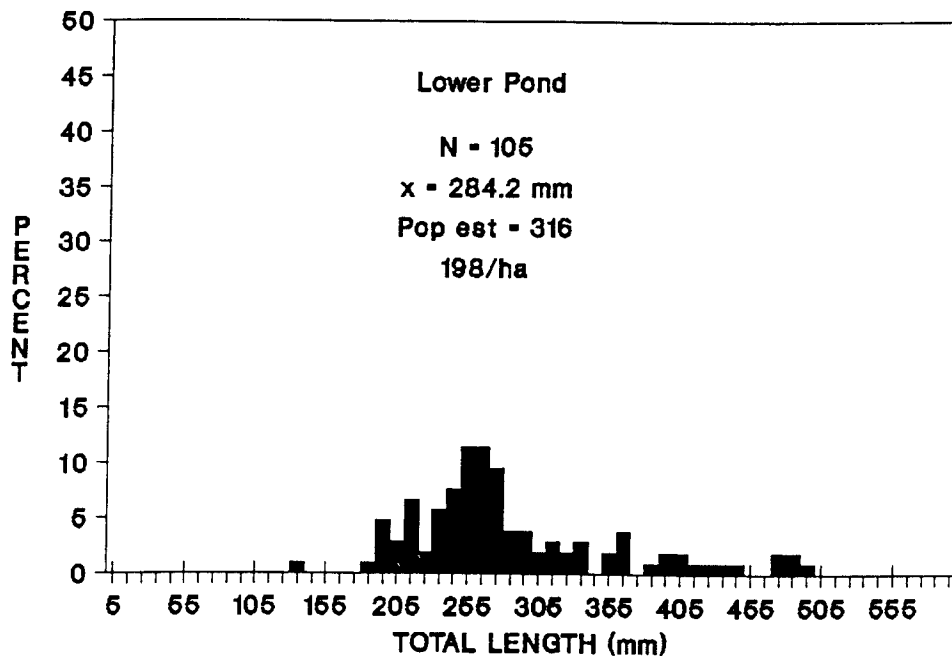
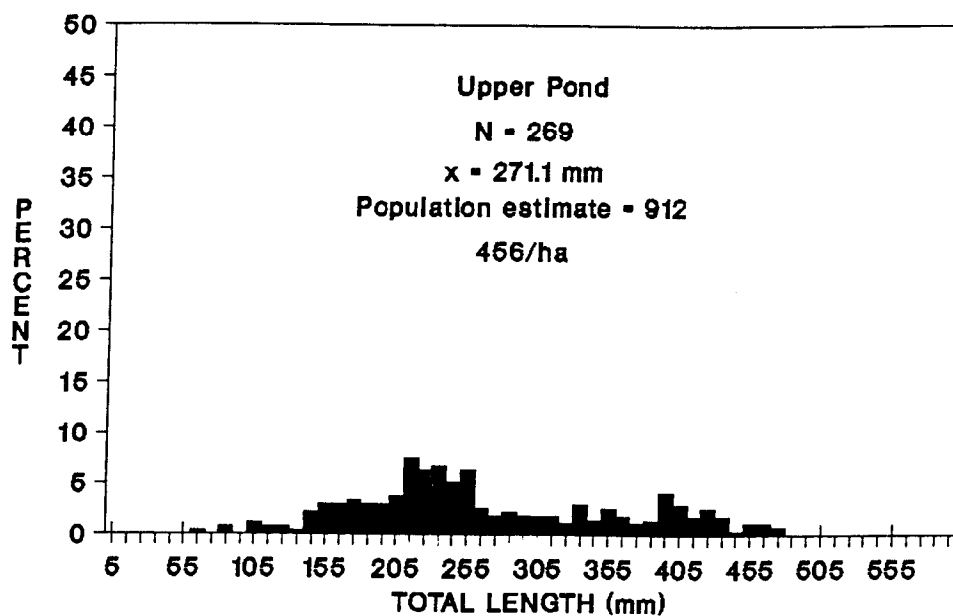


Figure 10. Length frequencies of wild rainbow trout sampled by electrofishing in the Niagara Springs Wildlife Management Area ponds during 1991.

Table 15. Number and percent of fish species sampled by beach seining in Oakley Reservoir, Idaho, 1989-1991.

Species	Sep. 6, 1989 Six hauls		Sep. 4, 1990 Three hauls		Oct. 18, 1991 Six hauls	
	Number	Percent	Number	Percent	Number	Percent
Spottail shiner	39	26.5	140	52.0	10	41.7
Redside shiner	32	21.8	4	1.5	0	0
Dace sp.	1	0.7	1	0.4	2	8.3
Chub sp.	0	0	1	0.4	0	0
Sucker sp.	56	38.1	76	28.2	2	8.3
Sculpin sp.	20	13.6	30	11.2	2	8.3
Rainbow trout	0	0	2	0.7	4	16.7
Yellow perch	1	0.7	15	5.6	4	16.7
Total	147		269		24	

Total Length (mm)	Spottail shiner	Dace sp.	Sculpin sp.	Sucker sp.	Rainbow trout	Yellow perch
30	2	2	1			
40				1		2
50	6					1
60	2			1		1
70			1			
80						
90						
100						
110					2	
120						
130						
140					1	
150					1	
160						
170						
180						
190						
200						
Total	10	2	2	2	4	4
Mean	52	39	56	55	128	52

Table 17. Length frequency of game fish and spottail shiner sampled in Oakley Reservoir outlet canal on September 30, 1991.

Total length (mm)	Spottail shiner	Rainbow trout	Walleye	Yellow perch
40	1			4
50	12			32
60				8
70	1			2
80	3			
90	1			
100		1		
110		1		
120				
130		1		
140				
150				
160		1		
170				
180				
190		1		
200				
210				
220				
230				
240				
250				
260				
270				
280		1		
290		1		
300				
310		2		
320				
330				
340				
350			1	
360		2		
370				
380				
390				
400				
410				
420				
430				
440				
450				
460				
470				
480				
490				
500				

Table 17 continued.

Total length (mm)	Spottail shiner	Rainbow trout	Walleye	Yellow perch
510				
520				
530			1	
540				
550				
Total	18	11	2	46
Mean	62	238	442	57

Table 18. Length frequency of fish caught in gill nets in Oakley Reservoir on October 17-18, 1991.

Total length (mm)	Rainbow trout	Walleye	Sucker sp. ^a
140			
150			1
160	2		4
170			6
180			3
190			1
200		1	1
210	1	1	6
220			8
230			3
240			
250			1
260			
270		1	2
280	1	1	3
290	1		2
300			1
310	4		3
320	1		
330	3		
340	1		3
350	1	1	
360			4
370			1
380			1
390		1	2
400		2	
410		3	
420		1	
430		2	
440			
450			
460			
470			
480		1	
490			
500		2	
510		2	
520			
530		1	
540			
550		1	
560			
570			
580			
590		1	
600			

Table 18 continued.

Total length (mm)	Rainbow trout	Walleye	Sucker sp. ^a
610			
620			
630			
640		1	
650			
660			
670			
680			
690			
700			
710			
720			
730		1	
Total	15	24	56
Mean	291	442	250

^a Not all suckers were measured.

Rupert Gravel Pond

In July 1990, during electrofishing on Rupert Gravel Pond, it was found that adult common carp were easily collected (Partridge and Corsi 1993). On June 19, 1991, Rupert Gravel Pond was electrofished to sample fish populations and to remove excess common carp. During 50 minutes of electrofishing, 27 largemouth bass, 5 bluegill, and 54 yellow perch were sampled. Additionally, five juvenile (120 mm to 170 mm) and about 30 gallons of adult carp were removed. Largemouth bass ranged from 70 mm to 325 mm, with a mean length of 100 mm (Table 19). Mean length of bluegill was 77 mm and yellow perch 108 mm.

Salmon Falls Creek Reservoir

On August 18, 1991, four beach seine hauls were made in Salmon Falls Creek Reservoir to monitor young-of-the-year forage availability and spottail shiner reproduction. The four sites were the boat ramp at the dam, Whiskey Slough, Lucas Point, and Gray's Landing. Due to the large number of yellow perch sampled, perch and black crappie *Pomoxis nigromaculatus* numbers were estimated. The samples collected 10,000 yellow perch, 500 black crappie, 15 spottail shiner, 1 redbreast shiner, 3 sucker sp., and 1 walleye. Two year classes of spottail shiner were sampled with lengths ranging from 42 mm to 85 mm (Table 20). Yellow perch young-of-the-year ranged from 37 mm to 70 mm, and black crappie 28 mm to 50 mm. The one walleye seined was also a young-of-the-year at 110 mm.

In May 1991, 44 walleye were collected by electrofishing in Salmon Falls Creek Reservoir, incidental to the trout research studies on the reservoir. These walleye were tagged with numbered Floy tags with the inscription "RTN IFG". Walleye tagged ranged from 230 mm to 790 mm, with the largest fish weighed being 5.5 kg (Table 21). Ten (23%) of the tagged fish were reported to be harvested by anglers during May through August 1991. Fish harvested represented nearly the same size distribution as those tagged.

Stone Reservoir

Stone Reservoir is an irrigation storage reservoir located on Deep Creek in Oneida County, Idaho (Sec 35, T15S, R32E). Deep Creek is a tributary to Salt Lake in the Great Basin. The reservoir is 11 km north of Snowville, Utah at an elevation of 1,400 m. The reservoir is owned by the Delmore Canal Company and provides irrigation water to lands both in Idaho and Utah. When full, the reservoir has a surface area of 123 hectare and a volume of 8.1 cu hectometers (6,594 acre ft)(IDWR 1981). Dam height is 10.4 m. Drainage area above the reservoir is 655 sq km.

On June 10 and 11, 1991, fish populations were sampled in Stone Reservoir using both the Smith-Root and Coffelt electrofishing boat setups and two netting stations, consisting of one sinking and one floating gill net and one trap net (Figure 11). Near?_ all of the reservoir shoreline was electrofished during 120 minutes of sampling all fish and 35 minutes of sampling game fish only. Four species of fish were sampled, consisting of hatchery rainbow trout, largemouth bass, yellow perch, and common carp. Common carp were the most numerous species, comprising 100%, 95%, and 73%, respectively, of the fish caught by trap nets, gill nets, and electrofishing (Table 22). Yellow perch were the most abundant game fish sampled, followed by largemouth bass and hatchery rainbow trout.

Lengths of hatchery rainbow trout ranged from 250 mm to 400 mm, with a mean length of 297 mm (Table 23). Only three largemouth bass exceeded 305 mm, with the largest being 465 mm and 2.0 kg. Yellow perch were primarily small, with only 11% exceeding 200 mm. Common carp ranged from 75 mm to 540 mm.

Table 19. Length frequency of fish sampled from Rupert Gravel Pond on June 19, 1991.

Total length (mm)	Largemouth bass	Bluegill	Yellow perch
40			
50		4	
60			
70	12		
80	10		
90	2		6
100			22
110			24
120			1
130			
140			
150			
160			
170		1	
180			
190			1
200			
210			
220			
230			
240			
250			
260	2		
270			
280			
290			
300			
310			
320	1		
330			
340			
350			
Total	27	5	54
Mean	100	77	108

Table 20. Length frequency of measured fish from beach seines in Salmon Falls Creek Reservoir on August 19, 1991.

Total Length (mm)	Spottail shiner	Redside shiner	Sucker sp.	Yellow perch	Black crappie	Walleye
10						
20					1	
30				2	8	
40	5			27	3	
50	3			9	1	
60			1	6		
70	1			1		
80	1	1				
90	1			1		
100						1
110				1		
120						
130						
140						
150						
Total	11	1	1	47	13	1
Mean	58	80	61	52	37	105

Table 21. Length frequency of walleye tagged in Salmon Falls Creek Reservoir and of the tagged walleye reported by anglers.

Total Length (mm)	Tagged	Harvested
200		
210		
220		
230	1	
240		
250		
260		
270		
280		
290		
300		
310		
320		
330	1	
340	1	
350	3	1
360	3	
370	3	2
380	1	
390		
400		
410		
420		
430	1	
440	1	
450	1	
460	1	
470	1	1
480	2	1
490		
500	1	
510	1	
520		
530	3	1
540	1	
550		
560		
570	1	
580	1	1
590	2	
600		
610		
620		
630		
640		
650	1	

Table 21 continued.

Total Length (mm)	Tagged	Harvested
660	1	
670	2	
680		
690		
700	1	1
710		
720	2	1
730	1	
740		
750	2	
760	1	
770	2	1
780		
790	1	
800		
Total	44	10
Mean	531	534

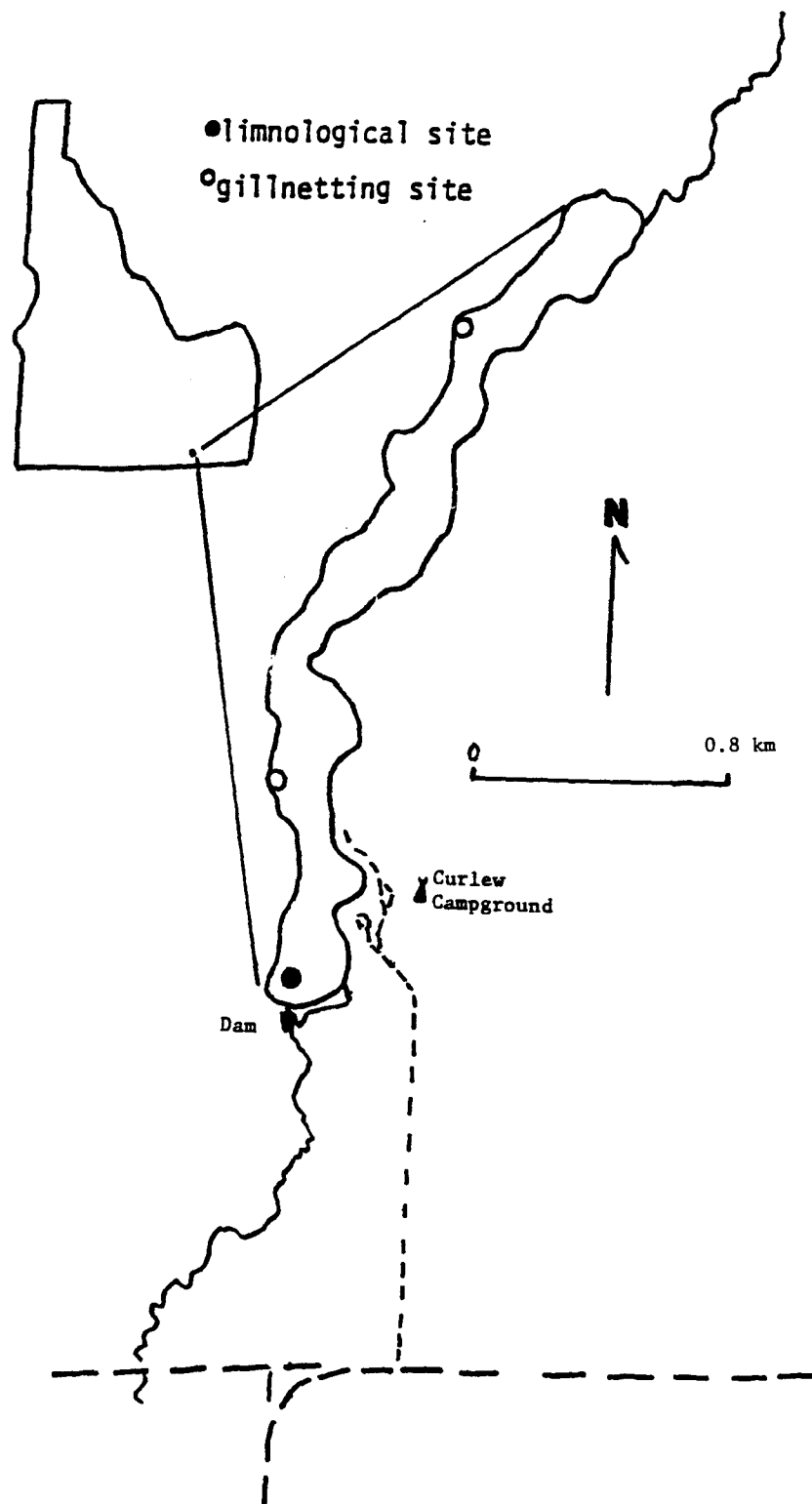


Figure 11. Location of sampling sites used in 1991 in Stone Reservoir during 1991. Electrofishing included all shoreline except adjacent to campground.

Table 22. Number of fish sampled by various gears in Stone Reservoir on June 10-11, 1991. Percentages by gear are in parenthesis.

Method	Time (hours)	Rainbow trout	Largemouth bass	Yellow perch	Common carp	Total
Electrofishing						
All species	2.0	5(2)	8(4)	45(21)	158(73)	216
Game fish only	0.6	5(17)	10(34)	14(48)	-	29
Gill Nets (4) ^a	62.0	4(3)	1(1)	2(2)	125(95)	132
Trap nets (2)	32.0	0(0)	0(0)	0(0)	2(100)	2

^a Two sinking and two floating gill nets.

Table 23. Length frequency of fish sampled in Stone Reservoir on June 10-11, 1991.

Total Length (mm)	Rainbow trout	Largemouth bass	Yellow perch	Common carp
50				
60		1	1	
70			16	1
80			9	
90		3	1	
100		1		
110		3		
120			1	
130			10	
140			7	
150			7	
160			2	
170				
180		1		12
190				33
200			1	49
210		1	1	39
220				29
230		4	2	20
240			3	17
250	2			16
260		1		12
270	2			7
280	2			3
290	4			7
300	1			7
310	1			8
320				4
330				7
340				3
350				4
360	1			4
370				
380				
390				
400	1	1		
410		1		
420				
430				
440				1
450				
460		1		1
470				
480				
490				
500				

Table 23 continued.

Total Length (mm)	Rainbow trout	Largemouth bass	Yellow perch	Common carp
510				
520				
530				
540				1
550				
Total	14	19	61	285
Mean	297	197	124	238

Water temperature and dissolved oxygen profiles were taken in front of the dam at Stone Reservoir on June 11, 1991. Dissolved oxygen ranged from 7.9 to 8.5 mg/l, with temperatures ranging from 18.2°C at the surface to 16.5°C at the bottom (Figure 12). Alkalinity was measured at 180 mg/l, and hardness at 210 mg/l.

Sublett Reservoir

Angler Questionnaire

An angler questionnaire was developed for Sublett Reservoir to acquire public opinion on management direction. The questionnaire was handed out at public meetings, at the reservoir, and attached to a newsletter that was sent to a random sample of 1,000 regional fishing license buyers. Replies were scored as follows: 11 = 3, #2 = 2, and 03 = 1, and a total score for both public meetings and mailed responses.

Public meeting respondents (N = 12) preferred a 6-month open season with quality fishing regulations (score = 16), followed by no change (10) or a 6-month season with special regulations (10) for selected species (Appendix D). Responses received in the mail (N = 61) were in favor of leaving the season and limits as they are (6-months with six fish) (score = 110), followed a distant second by a general year-round season with no additional restrictions (45). A number of anglers commented that they felt the introduction of brown trout was a detriment to the fishery and should be discontinued.

Catchable Trout Evaluations

In 1991, as in 1990, standard reward jaw tags were placed on rainbow trout released in a variety of regional waters. People returning tags received a "TROUT" ball cap (Partridge and Corsi 1993). Tag returns were prompted by the tag being labeled "RTN IFG", with only one general public news release.

Tag returns ranged from 0% to 40% for fish released in 1991 (Table 24). The best returns were from the Malad River between the two Idaho Power Company diversions. Marked hatchery fish released during May into Lower Salmon Falls Reservoir were in poor health and showed very poor returns. Tag returns received in 1991 from fish released in 1990 are also included in Table 24. These tag totals include 1990 tags.

Regional Creel Surveys

Information was collected on 32 regional waters on the general stream opener (Memorial Weekend, May 25) and on the Hagerman WMA on its July 1 opener. Catch rates ranged from 0 to 2.4 fish/hr (Table 25). Data from miscellaneous creel checks, which were made on 19 regional waters throughout the year, are presented in Table 26. Species observed in creel included rainbow trout, cutthroat trout Oncorhynchus clarki, brown trout, brook trout Salvelinus fontinalis, fall chinook salmon, kokanee, smallmouth bass, largemouth bass, bluegill, yellow perch, walleye, coho salmon O. kisutch, and white sturgeon Acipenser transmontanus.

Twelve fishing tournaments were conducted by fishing clubs in Region 4 during 1991 (Table 27). Success averaged 0.17 bass/hr on both Lower Salmon Falls and Anderson Ranch reservoirs.

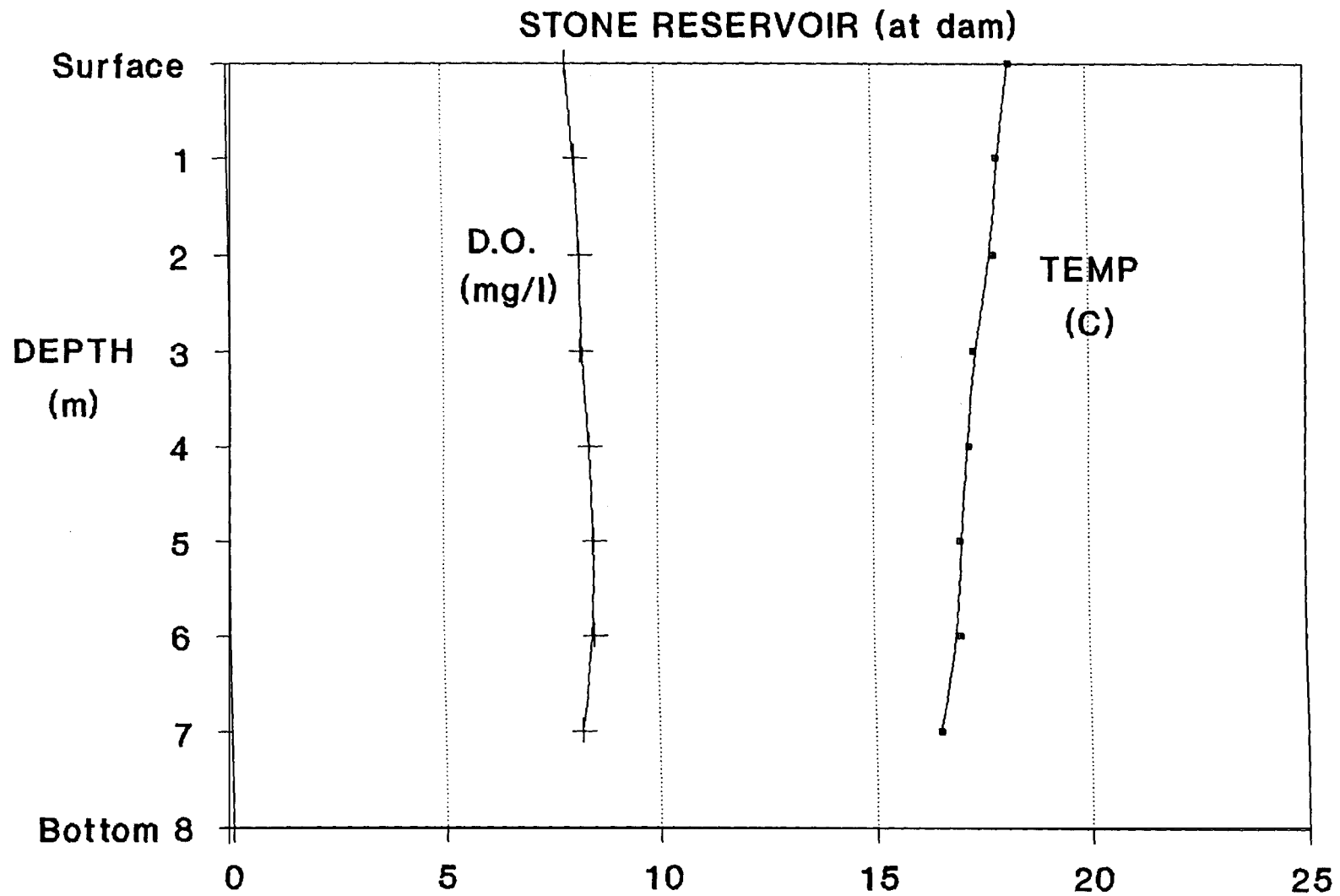


Figure 12. Temperature and dissolved oxygen profiles in Stone Reservoir on June 11, 1991.

Table 24. Catchable trout jaw tag data for Region 4 waters during 1991.

Location	Date released	Fish size (no/kg)	Tags released	Tags returned	Percent
Crystal Lake	Aug 15, 1990 ^a	3.8	50	18	36
	Sep 01, 1990	3.3	50	17	34
	Oct 22, 1990	3.6	50	15	30
	Nov 16, 1990	3.1	50	18	36
Dierke's Lake	Apr 11, 1990	9.9	100	26	26
Emerald Lake	Jul 11, 1990	5.7	50	1	2
	Nov 02, 1990	5.7	100	42	42
Oakley Reservoir	Jun 05, 1990	7.5	100	6	6
Perrine Coulee	Jul 07, 1990	5.7	50	5	10
	Aug 22, 1990	6.6	25	3	12
Salmon Falls Creek Reservoir	May 01, 1990	8.6	100	17	17
Snake River, Sligars	Sep 07, 1990	6.9	100	2	2
Bellevue Canal	May 24, 1991	6.2	100	13	13
	Jun 20, 1991	5.6	50	4	8
Dog Creek Reservoir	Apr 19, 1991	5.5	150	31	21
Emerald Lake	Mar 21, 1991	6	100	0	0
	Apr 08, 1991	5.9	100	0	0
	May 07, 1991	5.5	100	0	0
	Jun 05, 1991	6.3	100	5	5
	Nov 19, 1991	5.9	100	3	3
Jerome Canal	May 21, 1991	7.1	200	45	22
	Aug 15, 1991	8.5	50	8	16
Rock Creek (city park)	Aug 09, 1991	8.8	50	3	6
	Aug 29, 1991	6.8	50	7	14
Malad River	May 08, 1991	6.4	50	10	20
	Jun 27, 1991	12.1	50	20	40
	Jul 19, 1991	10	50	11	22
	Aug 07, 1991	8.5	50	11	21
Lower Salmon Falls Reservoir	May 22, 1991	11.7	300	1	<1
	Sep 12, 1991	7.2	300	22	7
Salmon Falls Creek Reservoir	Sep 16, 1991	5.5	300	25	8

^a Returns from fish planted in 1990 include 1990 tag returns.

Table 25. Results of creel checks performed at Region 4 waters on opening day (May 25) of the general fishing season, 1991.

Location	Anglers	Hours	Fish ^a caught											
		fished	HRB	WRB	CT	BRN	EB	CHS	KOK	LMB	SMB	BG	YP	WS
Anderson Ranch Res.	92	294	21	1				4	1		16			
Baker Creek	9	7												
Big Wood River	8	11	1											
Big Wood River (below Magic)	10	22.5	27											
Billingsley Creek	19	68		20		19								
Birch Creek	14	90	55		7									
Bruneau Ponds	5	48.5										1		
Cassia Creek	6	16	2	1			2							
Cedar Creek	16	86	9											
Clydes Creek	7	17	6				4							
Dollar Lake	1	1	2											
Emerald Lake	2	3												
Hagerman WMA	37	68.5	41							1		5		
Kids Pond (Burley)	9	6												
Lake Creek	3	9	7				6							
Little Wood River (Lower)	20	41	37											
Little Wood River (Upper)	14	27	6											
Little Wood Reservoir	20	58	25											
Magic Res.	33	104.5	15											
Malad River	62	118.5	154	14										
Morow Res.	6	19												
Penny Lake	6	8	18			1								
Rock Creek	20	40	36	5		1								
Salmon Falls Creek Res.	67	149		1				1	3		1			
S. Fk. Boise River	57	58	8											
Sublett Res.	44	170.5	1	12	23									
Thorn Creek Res.	17	46	46											

R540193SB

Table 25 continued.

Location	Anglers	Hours	Fish ^a caught											
		fished	HRB	WRB	CT	BRN	EB	CHS	KOK	LM	SM	BG	YP	WS
Trail Creek	11	11												
Trapper Creek	35	95	31											
Warm Springs Creek	20	100.5	35											
Anderson Bass Ponds ^b	54	96.1	46							46	1	58		
West Bass Ponds ^b	18	34.5								80			3	

^a HRB=Hatchery rainbow trout, WRB=Wild rainbow trout, CT=Cutthroat trout, BRN=Brown trout, EB=Eastern brook trout, CHS=Chinook Salmon, KOK=Kokanee salmon, LMB=Largemouth bass, SMB=Smallmouth bass, BG=Bluegill, YP=Yellow perch, WS=White sturgeon.

^b July 1, 1991 opener.

Table 26. Results of spot creel checks performed at Region 4 waters during 1991, excluding opening day.
Includes released fish.

Location	Anglers	Hours	Fish ^a								
		fished	HRB	WRB	CHS	KO	SMB	Y	WAL	CO	WS
Anderson Ranch Res.	71	155.5	23	7	3	2	13	3			
Big Smokey Creek	10	6.0	1	1							
Big Wood River	30	50.0	6	19							
Emerald Lake	23	30.0	6								
Featherville Dredge Pond	12	19.0	6								
Little Wood Res.	2	2	1								
Little Camas Res.	10	35.5	19	10			3				
Little Smokey Creek	6	2.7									
Lake Walcott	94	161.0	27	1							
Lake Cleveland	18	10.0	26								
Salmon Falls Creek Res. (Lower)	13	8.5	5								
Magic Res.	18	46.5	8	1							
Malad River	25	22.5	48	22							
Milner Res.	9	7.1									
S. Fk. Boise River	48	43.4	3	3							
Salmon Falls Creek Res.	51	116.5	15	1		7	2		4	1	
Snake River (below Milner Dam)	20	25.7									
Snake River {below Lower Salmon Falls)	9	7.5									2
Sublett	5	5		1							

^a HRB=Hatchery rainbow trout, WRB=Wild rainbow trout, CHS=Chinook Salmon, KOK=Kokanee salmon,
SMB=Smallmouth bass, YP=Yellow perch, WAL=Walleye, COH=Coho salmon, WS=White sturgeon.

Table 27. Number and success of fishing tournaments in Region 4 up to 1991.

Water	Year	Number of tournament	Total angler	Hours fished	Largemouth bass No	Avg. wt. No./hr. (kg)	Smallmouth No	Avg. wt. No./hr. (kg)	Other	Total harvested
Anderson Ranch Res.	1990	8	148	1,61			339	0.21	0.64	14
	1991	5	91	855			149	0.17	0.60	0
Salmon Falls Creek Res.	1990	1	10	100			4	0.04	0.36	0
Snake River (Bell Rapids)	1990	3	57	503	74	0.15	0.95	3	0.01	0.82
	1991	7	90	729	122	0.17	1.00			0
Snake River (Upper Salmon Falls Res.)	1990	3	21	140	6	0.04	1.00	28	0.20	0.68
	1990	1	450	900					RB ^a	300
Perrine Coulee										

^a Rainbow trout stocked for kids tournament.

ACKNOWLEDGEMENTS

Data on kokanee populations in Anderson Ranch Reservoir were collected and analyzed by Bruce Rieman and other fisheries research personnel. Fisheries aides Christie Cockerham, Jane Mauser, and Chet Loveland collected field data and assisted with data summarization and analysis. Conservation officers and regional and research staff collected and assisted with creel data.

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APPENDICES

Appendix A. Bruneau Dunes State Park Angler Questionnaire

Anglers - Our most recent statewide angler survey revealed that over 70% of anglers having an opinion on specialized bass management were interested in having more quality or trophy bass fisheries, even if it meant restrictive regulations in those areas. Bruneau Dunes State Park offers a unique opportunity to provide a trophy bass fishery because fish grow quickly, several ponds are present allowing diversified opportunity, and good numbers of bluegills are present for harvest-oriented anglers. Special regulations would not prevent anglers from fishing with bait. A trophy regulation (2 fish over 20") would greatly reduce harvest but would provide the largest fish. A quality regulation would be less restrictive (2 fish under 12" or over 16") and would provide more large bass than the current regulation. Both regulations would improve fishing, but are not necessary to maintain populations.

We are asking you, the anglers, to tell us what type of management you would prefer for the Bruneau Dunes bass populations. Please answer the following questions and return this questionnaire to:

1. Bruneau Dunes State Park Staff
- or 2. Bruneau Dunes State Park Headquarters
- or 3. Idaho Department of Fish and Game
868 East Main, Box 428
Jerome, ID 83338

1. Please check the option which best expresses your opinion on bass management at Bruneau Dunes State Park:

Number responses - Public meetings (25) at park (23) mail (26)

_____	Only the upper (smaller) main pond should be managed for larger bass.	0%	4%	0%
_____	Only the lower (larger) main pond should be managed for larger bass.	0%	9%	12%
_____	Would like one pond managed for larger bass, but don't care which one.	8%	26%	8%
_____	Would like both ponds managed for larger bass.	88%	56%	77%
_____	Do not want either pond managed for larger bass.	4%	4%	4%

Appendix A continued.

2. Please check the type of bass management which you would most like to have:

Number responses - Public meetings (25) at park (24) mail (25)

_____	No change - 2 bass, none under 14"			
		12%	25%	28%
_____	Quality - 2 bass, none between 12" and 16"			
		20%	25%	28%
_____	Trophy - 2 bass, none under 20"			
		56%	38%	44%
_____	General - 5 bass, none under 12"			
		12%	12%	0%

Thank you for your input. Your responses are extremely valuable in helping us to manage your fisheries.

Appendix B. Lower Salmon Falls Reservoir and Snake River, Malad Reach
newsletter questionnaire.

PLEASE CIRCLE THE APPROPRIATE ANSWER

- | | | | | |
|----|---|---------------------------------------|------------------|----------------|
| 1. | Do you currently fish the Bell Rapids
(Lower Salmon Falls Reservoir) area: | <u>Yes</u>
66% | <u>No</u>
34% | <u>N</u>
83 |
| 2. | If yes, for what species? | Trout 57%
Bass 30%
Other 13% | | |
| 3. | Do you currently fish the Malad Reach
(Snake River below Lower Salmon Falls Dam)? | <u>Yes</u>
42% | <u>No</u>
58% | <u>N</u>
84 |
| 4. | If yes, for what species? | Trout 77%
Sturgeon 4%
Other 19% | | |
| 5. | Do you normally fish with? | Bait 38%
Lures 34%
Flies 28% | | |
| 6. | Would you favor managing Bell Rapids as a quality or trophy fishery
if it meant: | <u>Yes</u> | <u>No</u> | <u>N</u> |
| | Reducing the number of trout you could keep? | 63% | 37% | 75 |
| | Imposing size limits on trout:? | 66% | 34% | 77 |
| | Prohibiting the use of bait (all species)? | 32% | 68% | 75 |
| 7. | Would you favor managing the Malad Reach as a quality or trophy
fishery if it meant: | Yes | No | N |
| | Reducing the number of trout you could keep? | 63% | 37% | 75 |
| | Imposing size limits on trout? | 66% | 34% | 74 |
| | Prohibiting the use of bait (all species)? | 32% | 68% | 73 |
| 8. | Please add any additional comments you might have in the space
below: | | | |

Return to:
IDAHO DEPARTMENT OF FISH AND GAME
868 East Main, Box 428
Jerome, ID 83338

Appendix C. Angler questionnaire given out at Lower Salmon Falls Reservoir
(Bell Rapids).

How many days do you fish Lower Salmon Falls Reservoir (LSFR) in a year?
0-5 _ 20% 6-10 _ 16% 11-20 _ 16% 20+ _ 48% N=73

When fishing LSFR, do yo normally fish from:
Boat _ 42% Shore _ 34% Tube _ 24%

What is your preferred fishing method when fishing LSFR:
Bait _ 33% Lures _ 12% Flies _ 25% Combination _ 30%

Do you fish LSFR primarily to catch: Trout _ 88% Bass _ 9%
Other Species _ 3% Combination of Species _

Are you satisfied with the current fishery in LSFR?
Yes _ 19% No _ 81% N = 68

Do you feel there are problems with the current fishery (if so, rank by
number with 1 being the worst): Ranking -mean value

Access _ <u>#4 - 2.46</u>	Crowding _ <u>#2 - 2.35</u>
Size of fish _ <u>#3 - 2.40</u>	Fish catch rates _ <u>#1 - 1.91</u>
Type of fish _ <u>#5 - 3.13</u>	Other _

Would you fish for crappie if they were ~~introduced into the fishery?~~
Yes _ 69% No _ 31%

Would you be in favor of introducing crappie if it did affect the current
fishery (altered growth rates or numbers of trout, bass, bluegill)?
Yes _ 40% No _ 60%

Would you favor managing LSFR as a trophy fishery if it meant:

Reducing the number of fish you could keep?
Yes _ 55% No _ 45% N = 60

Imposing size limits on fish?
Yes _ 53% No _ 47% N = 62

Prohibiting the use of bait?
Yes _ 36% No _ 64% N = 59

If you have additional comments or suggestions, please list them below or
on the back.

Thank You,
Idaho Department of Fish and Game

Appendix D. Sublett Reservoir questionnaire.

Sublett Reservoir is an irrigation reservoir located about 45 miles southeast of Burley. It is the only reservoir in the area with a significant trout fishery. When full, it covers about 113 acres but during drought years, it is drawn down to about 10 acres in size. Waters in the drainage are productive resulting in excellent growth potential for trout in the reservoir. Currently some of the trout move into the short tributary streams and spawn, but the majority of the fishery comes from hatchery releases of fingerling trout into the reservoir. Species of fish released prior to 1990 include brown and cutthroat trout and coho salmon. From 1990 on, we will stock kokanee instead of coho due to availability of eggs. The major limiting factor on number of fish in the reservoir is the irrigation drawdown. In low water years, more fish leave the reservoir as it gets smaller than they do when reservoir levels remain high.

Present management of this fishery is to allow fishing for **six** months of the year (May 25 - Nov. 30, 1991) and to close it the rest of the year. This does allow some protection to growing and spawning fish.

Management of the fishery can continue as it is, be managed more for a quality fishery, or less as a general regulation fishery. Since this is your fishery, we would like to know how you feel we should manage it. Therefore, we have included a questionnaire on the back for you to provide your opinions. Please take the time to fill out the questionnaire and send it in or bring it by. As an incentive, each returned questionnaire will be entered into a drawing for a gift certificate from a local sporting goods dealer.

Number of responses - Public meeting - 12, Mail - 61.

Do you fish Sublett Reservoir? (Please circle the appropriate answer)

	<u>Presently (1990 or 1991)</u>	<u>Previously (before 1990)</u>	<u>No</u>
Meetings	2	3	1
Mail	16	28	8

Which type of regulation would you prefer for Sublett Reservoir?
(Select three in preferred order 1--Most (Value = 3), 2--Second (2), 3--Third (1))

<u>Score</u>		
	<u>Meetings</u>	<u>Mail</u>
2	45	General regulation. Year round, six fish limit.
10	110	No change. Open six months, six fish limit.
9	21	Year round. Two fish limit in reservoir and tributaries. Tributaries would be open six months.
5	20	Year round. Size and bag limit in reservoir for quality fishery.
16	36	Six month. Size and bag limit in reservoir on selected species such as cutthroat and/or brown trout.
10	39	Six month. Size and bag limit in reservoir on selected species such as cutthroat and/or brown trout.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management
Investigations

Project No: F-71-R-16

Title: Region 4 Rivers and Streams
Investigations

Job No.: 4-c

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

Fish populations were sampled by electrofishing in 10 streams and rivers in Region 4 during 1991 to acquire information for comments on stream projects and annual monitoring.

In 1991, trout populations (≥ 100 mm) were estimated in three sections of the Big Wood River. An estimated 564 wild rainbow trout Oncorhynchus mykiss ($3.86/100\text{ m}^2$, 25% > 200 mm) were in Section 6A (new highway channel). Section 6, immediately downstream, contained 1,009 rainbow trout ($6.23/100\text{ m}^2$, 13% > 200 mm) and 85 brook trout Salvelinus fontinalis. Section 3, Starweather, had an estimated 1,533 wild rainbow trout ($5.35/100\text{ m}^2$) with 36% of 200 mm or greater. Brown trout Salmo trutta redd counts above Magic Reservoir in 1991 totaled 86, up from 70 in 1990 and 67 in 1989. Only nine redds were observed below Magic Reservoir in spring counts for rainbow trout redds.

At the Bear Track Williams site on the Little Wood River, we estimated 258 brown trout (58% > 200 mm) and 30 rainbow trout (66% > 200 mm) in October 1991. Forty percent of the brown trout had deformed fins, indicating hatchery origin.

Wild rainbow trout (> 100 mm) estimates in the lower Malad River were 2,347 fish ($25.2/100\text{ m}^2$) in the spring. Thirty percent were greater than 199 mm and 5% greater than 299 mm.

Population estimates in the Point of Rocks area on Silver Creek in June 1991 showed 897 rainbow trout and 398 brown trout of 150 mm or greater (1.43 and $0.64/100\text{ m}^2$, respectively). By size, 50% of the rainbow and 100% of the brown trout were of 200 mm or greater; 43% and 44%, respectively, of 300 mm or greater; 9% and 32%, respectively, of 400 mm or greater, and less than 1% and 20%, respectively, of 500 or greater mm. Maximum water temperatures recorded were 21.6°C at the Point of Rocks and 22.6°C upstream at Highway 20.

In the South Fork Boise River at Deadwood Creek, we estimated 542 wild rainbow trout and 1,020 mountain whitefish Prosopium williamsoni (1.61 and $3.03/100\text{ m}^2$, respectively) over 100 mm. Twelve percent of the rainbow were of 200 mm or greater. Eight bull trout Salvelinus confluentus (195 mm to 330 mm) were also sampled.

Snake River estimates were 805 ($0.34/100\text{ m}^2$) hatchery and 100 ($0.04/100\text{ m}^2$) wild rainbow trout below Lower Salmon Falls Dam in June 1991, compared to 6.38 and 3.63, respectively, the previous fall. Drift boat electrofishing below the confluence of the Malad River resulted in an estimate of 225 hatchery ($0.04/100\text{ m}^2$) and 846 ($0.15/100\text{ m}^2$) total wild and hatchery rainbow trout.

Additional streams sampled included Cedar Draw, Copper, and Vineyard creeks and Antelope Springs.

Authors:

Fred E. Partridge
Regional Fishery Manager

Charles D. Warren
Regional Fishery Biologist

OBJECTIVES

To maintain information for fishery management activities and decisions for rivers and streams.

METHODS

Stream habitat data was collected using ocular and measurement techniques described by Petrosky and Holubetz (1985). Stream section lengths and widths at 5 to 10 transects per section were measured to determine section area. Physical habitat components including depth, substrate type, and water classification were recorded at each transect.

Fish populations were sampled with various electrofishing gear, depending on stream and river size. Gear included a Smith-Root Model 15-A backpack shocker, Coffelt Model VVP-15 shocker powered by a 5,000 watt generator mounted in either a canoe or drift boat, and a Smith-Root Model SR-18 electrofishing boat with a Model 5.0 pulsator. When using a canoe or the backpack, the crew waded. Population estimates were made using either a Seber-Le Cren two step removal or an adjusted (Chapman) Petersen mark and recapture estimate (Seber and Le Cren 1967, Ricker 1975). Variances, standard error, and confidence intervals were determined according to Chapman (In Ricker 1975) so size group estimates could be pooled. Total lengths of fish were recorded in 5 mm length groups.

Water temperatures (°C) were monitored at two sites in the Snake River in early 1991 and at two sites in Silver Creek during the later part of 1991 with Ryan TempMentor digital recording thermographs. Thermographs were set to record temperatures every 30 minutes. Daily mean temperatures were calculated from the 48 measurements between 0000 hours and 2400 hours, along with daily maximums and minimums.

RESULTS AND DISCUSSION

Antelope Spring

Antelope Spring is located northwest of Salmon Falls Creek Reservoir (NE 1/4, SW 1/4, Sec 11, T14S, R14E). Historically it was a tributary to Salmon Falls Creek, but flows from the spring are now diverted into an irrigation canal about 50 m below the spring below the county road crossing. The spring is on Bureau of Land Management (BLM) property, but immediately flows onto private ground. A pool about 1.5 m deep and 10 m across has been developed at the spring head. The area below the pool to the road and irrigation canal has been heavily impacted by grazing and has formed a wide shallow stream bed which has a dense cover of aquatic vegetation, primarily watercress *Rorippa* sp. Flows from the spring are approximately 0.01 to 0.03 m³/s (0.3 to 1.0 cfs). In conjunction with a proposed BLM fencing project, fish populations in the spring were sampled on April 16, 1991. A one-day mark and recapture population estimate was conducted in the spring pool with approximately 2 hrs between shocking runs with the Coffelt shocker. Incidental sampling was conducted in the canal below the road with a Smith-Root backpack shocker to determine fish species present.

Brook trout *Salvelinus fontinalis* were the only fish sampled in the spring and in the canal below the spring. In the spring pool, 117 brook trout were captured in both electrofishing runs, resulting in a population estimate of 196 ± 63. Brook trout sampled ranged from 36 mm to 370 mm, with a mean length of 194 mm (Figure 1).

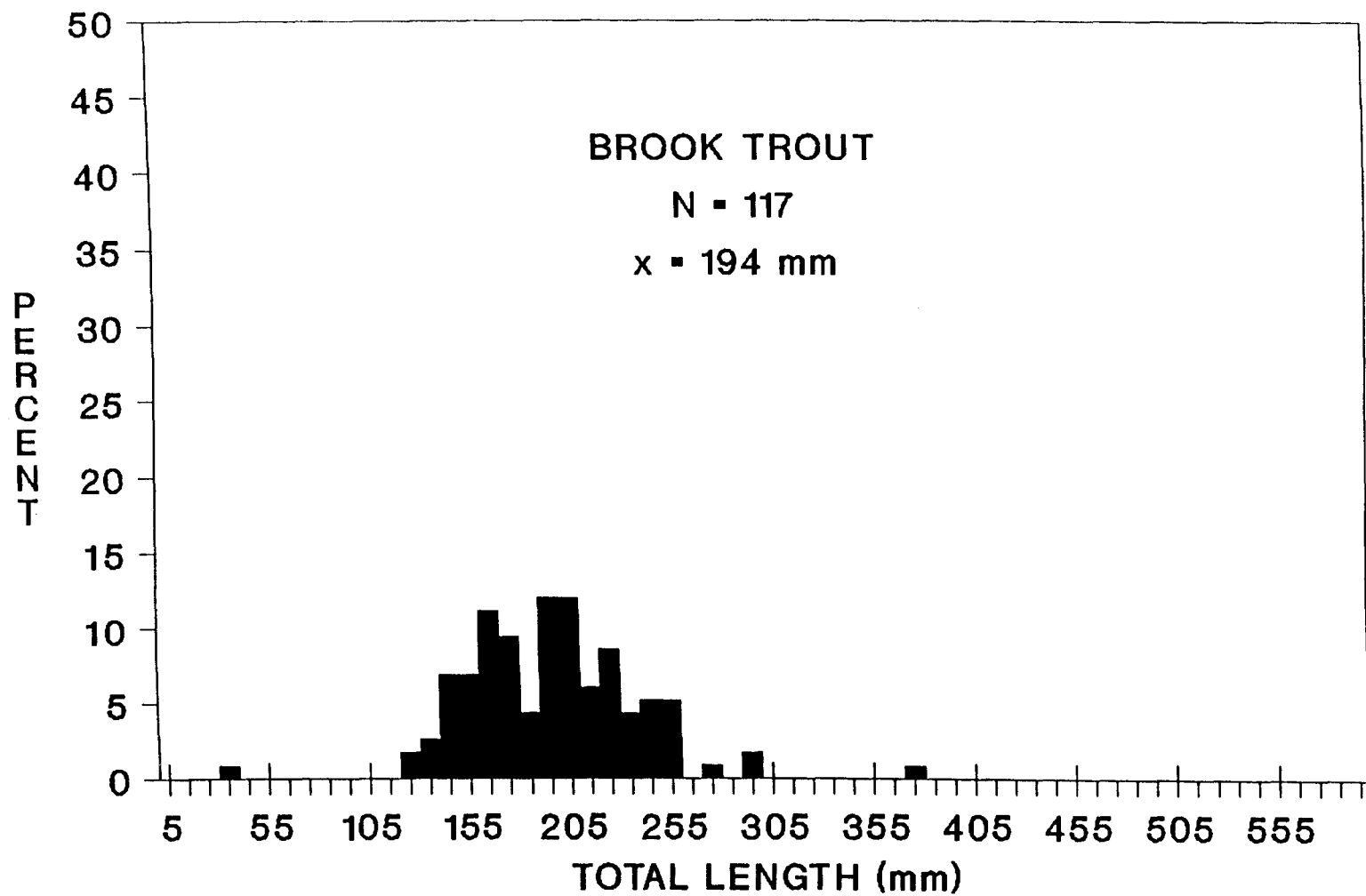


Figure 1. Length frequency of brook trout sampled by electrofishing in Antelope Spring on April 16, 1991.

Big Wood River

Population Estimates

During 1990, fishing regulations on the Big Wood River were changed. Catch-and-release waters were extended downstream from the Hulen Meadows Bridge to the Highway 95 Bridge (mi 122.2), between Ketchum and Hailey. A two trout limit with none between 305 mm and 406 mm was implemented from the Highway 95 Bridge downstream to the Glendale Diversion. Harvest seasons for trout were reduced from late May through the following March to late May through the end of November. In years prior to 1990, limits were six trout below Hulen Meadows Bridge, with the season extending from late May to March 31. Additional changes on the river included the relocation of approximately one kilometer of river channel upstream from Ketchum to allow for highway expansion in late 1990.

During 1991, fish population estimates were made in three reaches to begin to monitor potential differences resulting from these changes. Two of these reaches (3 and 6) were the same as Thurow (1990) used during 1986-88 (Figure 2). An additional reach (6A) was established in the new highway channel immediately upstream from reach 6 (Lake Creek). This new electrofishing reach extended from the first drop structure in the channel, downstream to the drop structure immediately above the Lake Creek footbridge; however, the settling pond in the lower portion of the reach was excluded. Length and area of reaches and general habitat characteristics are included in Table 1. Population estimates were made by wading downstream with the Coffelt electrofishing equipment in a canoe. A modified Petersen mark-recapture estimate was made on all wild rainbow trout *Oncorhynchus mykiss* of 100 mm or greater. Estimates were made for each 100 mm size class and estimates and variances summed to determine total population and confidence limits. Total length was measured on all game fish.

A total of 622 game fish were sampled in reach 3 (Starweather) during electrofishing runs on August 20 and 28, 1991. This reach is currently in the two fish slot limit area. During 1986-88, fishing regulations on this reach were a six fish limit, no restrictions, with the season extending from late May through the end of the following March. Wild rainbow trout accounted for 91.3%, mountain whitefish *Prosopium williamsoni* 7.9%, and brook trout 0.8%. The estimated population of wild rainbow trout of 100 mm or greater was 1,533 fish (5.35/100 m²) (Table 2). For fish of 200 mm or greater, the estimate was 550 fish, compared to 244 to 460 fish during 1986-88 (Thurow 1990) (Table 3). The percent of wild rainbow trout 200 mm or greater in this reach in 1991 which were 300 mm or greater was 27%, compared to an average of 21% in reaches 2 through 4 in 1986-88 (Table 4). Seven percent were 400 mm or greater, also up from the average of 5%. Wild rainbow trout sampled ranged from 35 mm to 490 mm, with a mean of 197 mm (Figure 3). Mountain whitefish ranged from 70 mm to 445 mm, with a mean of 326 mm, and brook trout 160 mm to 210 mm, with a mean of 193 mm (Table 5).

A total of 464 game fish were sampled in reach 6 (Lake Creek) on August 26 and September 5, 1991. Fishing regulations on this reach were catch-and-release, both prior to and after 1990. Wild rainbow trout accounted for 82.1%, mountain whitefish 3.0%, and brook trout 14.9%. The estimated population of wild rainbow trout of 100 mm or greater was 1,009 (6.23/100 m²). Brook trout were estimated at 85 (0.52/100 m²) (Table 6). For wild rainbow trout of 200 mm or greater, the estimate was 131, compared to Thurow's estimates of 90 to 176 during 1986-88. The percentage of 300 mm or greater decreased to 21%, compared to the average of 26% in 1986-88; however, the percentage of 400 mm or greater remained the same. In 1991, wild rainbow trout in reach 6 ranged from 70 mm to 445 mm, with a mean of 173 mm; mountain whitefish 50 mm to 420 mm, with a mean of 272 mm; and brook trout 80 mm to 380 mm, with a mean of 187 mm (Table 7).

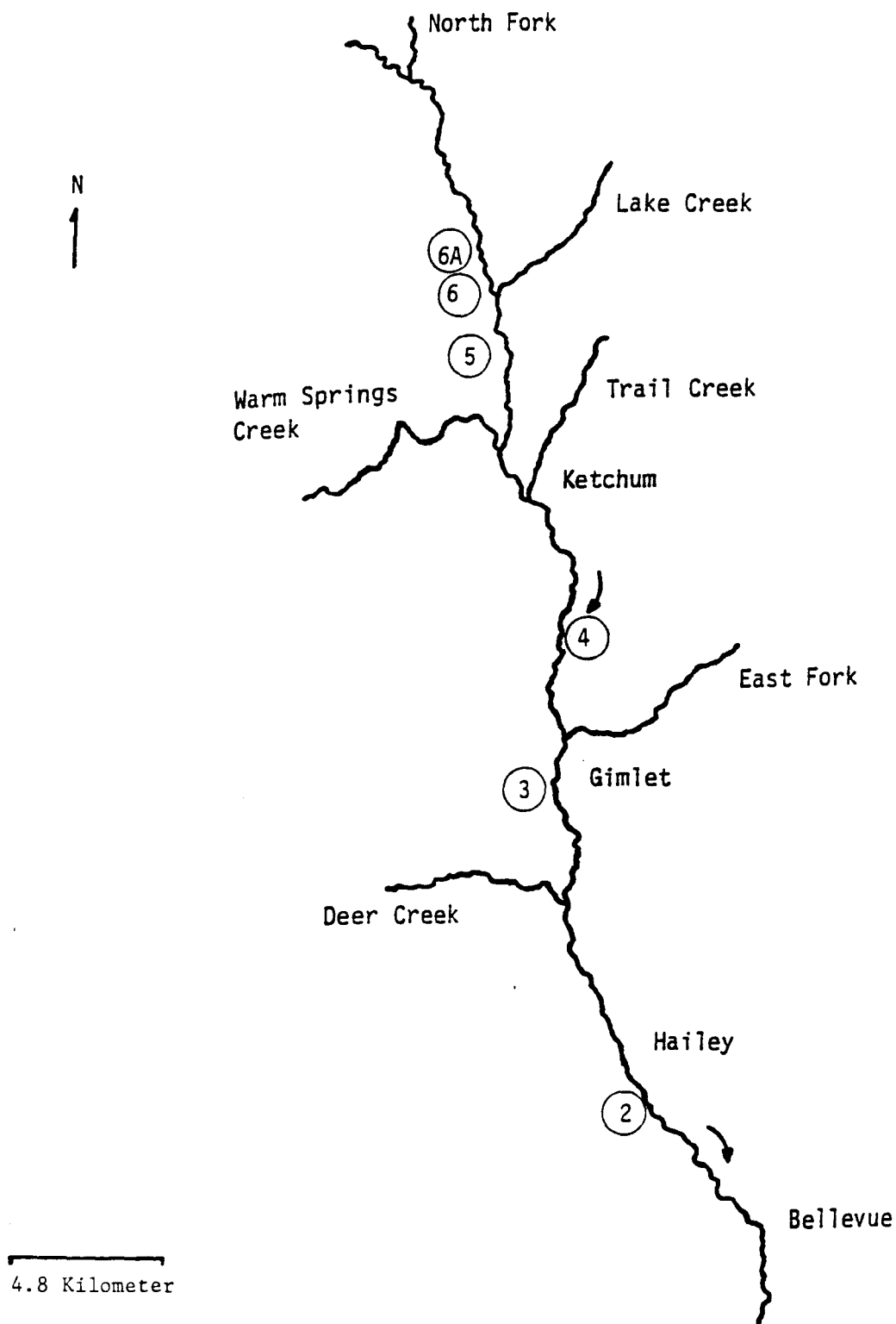


Figure 2. Location of electrofishing sites used on the Big Wood River.

Table 1. Habitat data collected at Big Wood River October 8-10, 1991.

	Starweather Reach 3	Lake Creek Reach 6	Highway channel Reach 6A
Channel Type	Meandered	Meandered	Constructed/ Meandered
Reach length (m)	1,208	1,149	973
Reach area (ha)	2.86	1.62	1.46
Conductivity (umhos/cm)	275	200	200
Mean Width (m)	23.7	14.1	15.0
Mean Depth (cm)	31.8	26.0	29.9
Habitat (U)			
Pool	13	0	3
Run	62	50	78
Pocket Water	7	0	0
Riffle	18	50	19
Back Water	0	0	0
Substrate Class (%)			
Sand	18	4	16
Gravel	14	10	8
Rubble	50	25	35
Boulder	18	38	41
Bedrock	0	0	0

Table 2. Population estimates of wild rainbow trout by size classes in the Big Wood River during August 1991.

Reach	Size class	Number marked	Number caught	Number recaptured	Population estimate	S.E.	No/loom	No/100m ²
<u>Starweather, 3</u>								
	100-199	188	129	24	983	173	81.4	3.43
	200-299	87	49	10	400	102	33.1	1.40
	300-399	23	32	6	113	36	9.4	0.39
	400-499	13	15	5	37	11	3.1	0.04
	Total	-	-	-	1,533	204	126.9	5.35
<u>Lake Creek, 6</u>								
	100-199	122	106	14	877	203	76.3	5.41
	200-299	44	43	18	104	18	9.0	0.64
	300-399	8	13	5	21	6	1.8	0.13
	400-499	3	2	1	6	2	0.5	0.04
	Total	-	-	-	1,009	204	87.8	6.23
<u>Highway channel, 6A</u>								
	100-199	133	107	33	426	60	43.8	2.92
	200-299	24	28	5	121	41	12.4	0.83
	300-399	9	5	4	12	2	1.2	0.08
	400-499	2	1	0	6	3	0.6	0.04
	Total	-	-	-	564	72	58.0	3.86

Table 3. Wild rainbow trout population estimates (≥ 200 mm) and densities during summer, 1986-88^a and 1991 in the Big Wood River.

Site	Year	Population estimate	95% C.I.	Trout/ km	Trout/ hectare
3	1986	460	(254-920)	431	211
	1987	244	(147-433)	229	137
	1988	392	(278-569)	367	232
	1991	550	(337-763)	455	192
6	1986	125	(73-235)	109	72
	1987	176	(83-405)	153	104
	1988	90	(50-180)	78	54
	1991	131	(95-167)	114	81
6A	1991	139	(59-219)	143	95

^a Thurow 1990.

Table 4. Estimated numbers and percentages of wild rainbow trout larger than 199 mm which exceeded 299 mm, 399 mm, and 499 mm during July - September, 1986-88 pooled^a, and 1991.

Year	Reach	Percent			Trout/km		
		≥ 300 mm	≥ 400 mm	≥ 500 mm	≥ 300 mm	≥ 400 mm	≥ 500 mm
1986-88	2,3,4	21.2	4.6	0.05	76	17	0.2
1991	3	27.3	6.7	0	125	31	0
1986-88	6	26.2	4.3	0.4	30	5	0.4
1991	6	20.6	4.6	0	23	5	0
1991	6A	13.0	4.3	0	18	6	0

^a Thurow 1990.

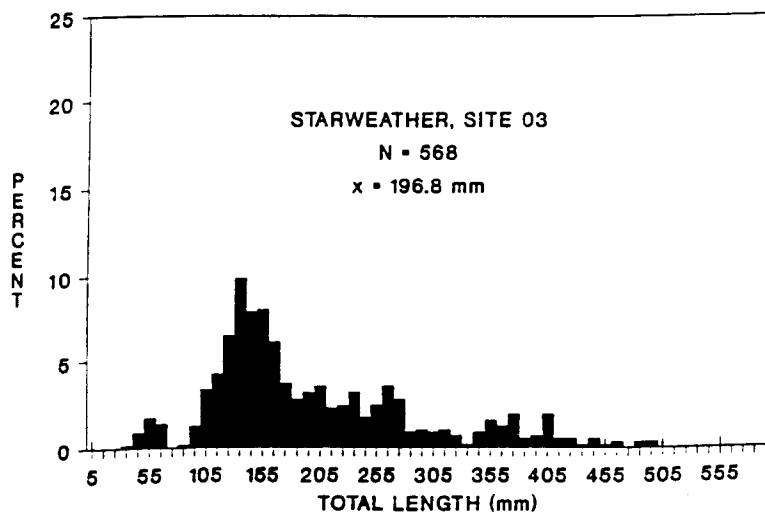
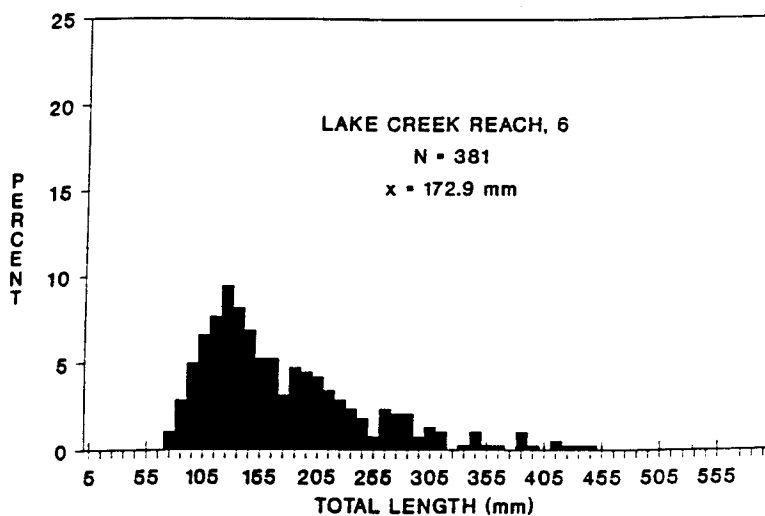
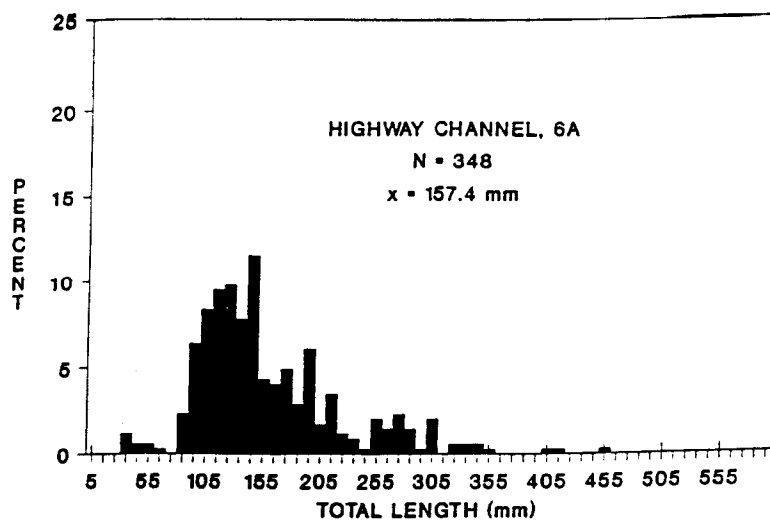


Figure 3. Length frequencies of wild rainbow trout sampled by electrofishing in the Big Wood River during summer, 1991.

Table 5. Length frequency of game fish sampled in reach 3, Starweather, of the Big Wood River on August 20 and 28, 1991.

Total Length (mm)	Wild rainbow trout	Mountain whitefish	Brook trout
20			
30	1		
40	5		
50	10		
60	8		
70		1	
80	1	5	
90	7	3	
100	19		
110	24		
120	37		
130	56		
140	45		
150	46		
160	35		1
170	21		
180	16		1
190	18		
200	20		2
210	13		1
220	14		
230	18		
240	10		
250	14		
260	20		
270	16		
280	5	1	
290	6	3	
300	5	2	
310	6		
320	4	2	
330	1	2	
340	5		
350	9	2	
360	7	2	
370	11	3	
380	3	4	
390	4	1	
400	11	1	
410	3	2	
420	3	6	
430	1	5	
440	3	4	

Table 5 continued.

Total Length (mm)	Wild rainbow trout	Mountain whitefish	Brook trout
450	1		
460	2		
470			
480	2		
490	2		
500			
Total	568	49	5
Mean	196.8	326.5	193.0

Table 6. Population estimates of brook trout by size classes in the Big Wood River during August 1991.

Reach Size class (mm)	Number marked	Number caught	Number recaptured	Population estimate	S.E.	No/ 100m	No/ 100m ²
Lake Creek, 6							
100-199	26	18	7	64	16	5.6	0.40
200-299	11	6	4	17	4	1.5	0.10
300-399	3	1	1	4	0	0.3	0.02
Total	-	-	-	85	17	7.4	0.52

Table 7. Length frequency of game fish sampled in reach 6, Lake Creek, of the Big Wood River on August 26 and September 5, 1991.

Total Length (mm)	Wild rainbow trout	Mountain whitefish	Brook trout
40			
50		1	
60			
70	4	3	
80	11	1	1
90	19		3
100	25		
110	29		
120	36		1
130	31		1
140	26		3
150	20		7
160	20		7
170	12		12
180	18		8
190	17		5
200	16		1
210	13		9
220	11		2
230	9		5
240	7		
250	3		
260	9		
270	8		
280	8		
290	3		
300	5		
310	4		
320			
330	1		
340	4	1	2
350	1	1	
360	1	2	
370		1	
380	4		2
390	1	1	
400			
410	2		
420	1	3	
430	1		
440	1		
450			
Total	381	14	69
Mean	172.9	272.1	187.0

A total of 390 game fish were sampled in reach 6A (highway channel) on August 22 and September 5, 1991. Wild rainbow trout accounted for 89.2%, mountain whitefish 5.9%, brook trout 4.1%, hatchery rainbow trout 0.5%, and rainbow x cutthroat hybrid O. mykiss x O. clarki 0.3%. The estimated population of wild rainbow trout of 100 mm or greater was 564 (3.86/100 m²). An estimated 139 wild rainbow trout of 200 mm or greater, with 13% being of 300 mm or greater and 4% of 400 mm or greater. Wild rainbow trout in the reach ranged from 35 mm to 450 mm, with a mean of 158 mm. Length frequencies of these fish and others sampled are in Table 8. Although water has only been in this channel since October 1990, fish are taking up residence. The only major difference at this time is the lower densities of wild rainbow trout in the 100 mm to 199 mm range. Most fish in the channel were captured in the pool areas associated with the drop structures and adjacent to the placed woody vegetation.

Trout Redd Counts

On November 15, 1991, an annual count of brown trout Salmo trutta spawning redds in the Big Wood River above Magic Reservoir was made. A total of 86 redds were observed (Table 9). The number of redds observed was up from the 70 seen in 1990 and the 67 seen in 1989, but still down from the 122 to 196 in the 3 preceding years. Drought conditions and reservoir drawdown are still the most likely reasons for lower numbers.

On May 14, 1991, a redd count was made on the Big Wood River from Magic Reservoir downstream to the Richfield Canal diversion. Nine rainbow trout redds were observed, compared to 115 seen in 1987 (Grunder et al. 1989) (Table 10). Due to drought conditions, flows below Magic Reservoir have decreased to less than 0.03 cm during some periods in the winter, compared to a low of 0.19 cm during the winter of 1986-87 (Harenberg et al. 1988, 1992).

Cedar Draw Creek

April 4, 1991, a water flow measurement and a fish population sample were taken on Cedar Draw Creek (SW 1/4, Sec 6, T10S, R15E) to provide information for a water rights hearing. Cedar Draw Creek originates from springs west of Twin Falls, Idaho and flows north into the Snake River. During summer, numerous irrigation returns increase volume substantially. Water flows were measured with a Marsh-McBirney Model 201D current meter. Fish were sampled with a Smith-Root backpack shocker and population estimated using Seber-Le Cren two step removal.

A 45.5 m length of stream with a mean width of 7.2 m (326 m²) was sampled with nine rainbow trout being captured. The estimated population was 12 fish \pm 12 (3.68/100 m²). Two of the rainbow trout were obviously hatchery and the other seven appeared to be wild. The rainbow trout ranged from 260 mm to 470 mm, with a mean of 321 mm. Weight ranged from 220 g to 1,050 g, with a mean of 424 g. The calculated standing crop was 15.6 g/m². Water flow was measured at 0.27 m³/s (9.5 cfs).

Copper Creek

Copper Creek lies in a small (approximately 25 sq km) drainage, 11 km west of Craters of the Moon National Monument in the northeast corner of Region 4. The stream flows into Lava Lake and any excess water disappears into the lava flows. Due to past grazing and burning of hillsides, the stream has a severe problem with high runoff flows, erosion, and the formation of deep gullies. Sediments from flood events are deposited in alfalfa fields and pastures at the lower end of the canyon. Drop structures (large horizontal pipes and logs) have been constructed in a number of areas in the main gully, but are unstable and are washing out; however, rocks placed in the upper reaches of the stream have stabilized head cutting.

Table 8. Length frequency of game fish sampled in reach 6A, Highway channel, of the Big Wood River on August 22 and September 5, 1991.

Total Length (mm)	Wild rainbow trout	Mountain whitefish	Brook trout	Rainbow x cutthroat	Hatchery rainbow trout
20					
30	4				
40	2				
50	2	1			
60	1	6	1		
70		10			
80	8	3			
90	22		2		
100	29				
110	33				
120	34				
130	27		1		
140	40				
150	15				
160	14		2		
170	17		3		
180	10		1		
190	21		2		
200	6		2		
210	12		1		
220	4			1	1
230	3				
240	1		1		
250	7				
260	5				
270	8				
280	5				
290	1				
300	7	1			
310					1
320	2				
330	2				
340	2				
350	1				
360					
370					
380					
390					
400	1				
410	1	1			
420		1			
430					
440					
450	1				
Total	348	23	16	1	2
Mean	157.6	110.0	166.2	225	265.0

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Table 9. Brown trout redd counts on Big Wood River and Rock Creek above Magic Reservoir.

Date	Big Wood River ^a					Rock Creek
	Area 1	Area 2	Area 3	Area 4	Total	
Nov 19, 1986		26	13	96	122	
Nov 19, 1987	104	62 ^c	13	30	196	--
Nov 15, 1988	13	75	31	39	158	
Nov 18, 1989	6	20	33	8	67	1
Nov 20, 1990	1	25	30	14	70	0
Nov 15, 1991	3	30	38	15	86	0

^a Area 1 - Rock Creek to Sheep Bridge.
Area 2 - Sheep Bridge to fence at USGS gauge.
Area 3 - Fence to Stanton Crossing.
Area 4 - Stanton Crossing to Davis Pond.
Rock Creek - Highway 20 to mouth.

^b Combined with previous reach.

^c A total of 42 female brown trout were trapped from this section and spawned at Hayspur Hatchery.

Table 10. Rainbow trout redd counts on Big Wood River below Magic Reservoir.

Date	Magic Dam to Trestle	Trestle to Richfield Canal	Total
April 17, 1987	-	-	115
May 14, 1991	9	0	9

A program developed by the Wood River Soil and Water Conservation District to help stabilize the stream and improve water quality has released beaver Castor canadensis into the drainage to construct dams and create impoundments to collect sediments. In addition to stabilizing the stream, a secondary benefit of the beaver ponds is the development of holding pools for fish.

On May 20, 1991, a cursory examination was made of Copper Creek to determine the presence of fish with a Smith-Root backpack shocker. All sampling occurred in Section 3, TIN, R23E, except for about 100 m in Section 2. Small pools in approximately 400 m of stream were sampled above the uppermost beaver pond, resulting in one ripe male rainbow trout (150 mm) being caught above the rock structure. A second similar fish was also observed. Nineteen wild rainbow trout were collected from the upper ends of the four beaver ponds and 10 fish were sampled in about 200 m of stream below the ponds and enclosure. All fish observed were wild rainbow trout. Fish sampled ranged from 65 mm to 220 mm, with a mean of 122 mm (Figure 4).

Little Wood River

The Little Wood River at the Bear Track Williams catch-and-release area was electrofished in October 1991 to monitor brown trout populations. A drift boat with a Coffelt electrofisher was used and all trout over 100 mm were marked. A total of 111 brown trout and 25 wild rainbow trout were sampled in the two shocking runs. The brown trout population estimate was 258 fish (1.55/100 m²) and the rainbow trout estimate was 30 (0.18/100 m²) (Table 11). The brown trout population estimate for this area was down substantially from the 579 and 329 estimated in 1986 and 1987, respectively (Thurow 1987, 1988). The decrease in population size is probably due to a decrease in stocking rates in 1990 (32,410) and 1991 (50,000). Approximately 100,000 brown trout fingerlings have been released in the Little Wood River annually in prior years. Forty percent of the brown trout sampled in 1991 had fin deformities, indicating hatchery origin.

Size of brown trout sampled was up with the mean length being 267 mm in 1991, compared to 241 mm in 1986 and 258 mm in 1987. Brown trout ranged from 125 mm to 510 mm and rainbow trout from 170 mm to 265 mm (Table 12, Figure 5).

Malad River

The Malad River is formed at the confluence of the Big and Little Wood rivers. From this point, it flows about 17 km southwest to the Snake River, 5 km north of Hagerman, Idaho. Flows in the upper 12 km of the river are controlled by upstream irrigation diversions and at times drop to virtually no water. Below the falls at the Interstate 84 crossing, spring flows in excess of 28 m³/s (990 cfs) provide good quality water; however, most of this flow is diverted through two hydropower diversions. The lower diversion removes all but 2.2 m³/s (78 cfs) of flow from the lower 2 km of river and discharges directly into the Snake River, downstream from the mouth of the Malad River. Flows below the diversion are relatively stable during most of the year, except during powerplant maintenance periods, when the entire flow is released. Stream habitat is dominated by boulders (51%) with gravel and rubble pockets (Table 13). Due to upstream diversions, there is relatively little irrigation return flow in the lower river and gravels are very clean.

Fish populations were sampled in the Malad River between the mouth and the lower diversion in March through April 1991 to determine population status and to mark fish for spawning movements from the Snake River. A mark-recapture population estimate was made by collecting fish with the Coffelt electrofisher in a canoe. The sample area was from the U.S. Geological Survey (USGS) gauge station adjacent to the old power house, upstream 425 m to the end of the access road. Rainbow trout over 100 mm were marked with a fin punch to estimate population size, and most fish over 150 mm also received numbered Floy tags to monitor movement into the Snake River.

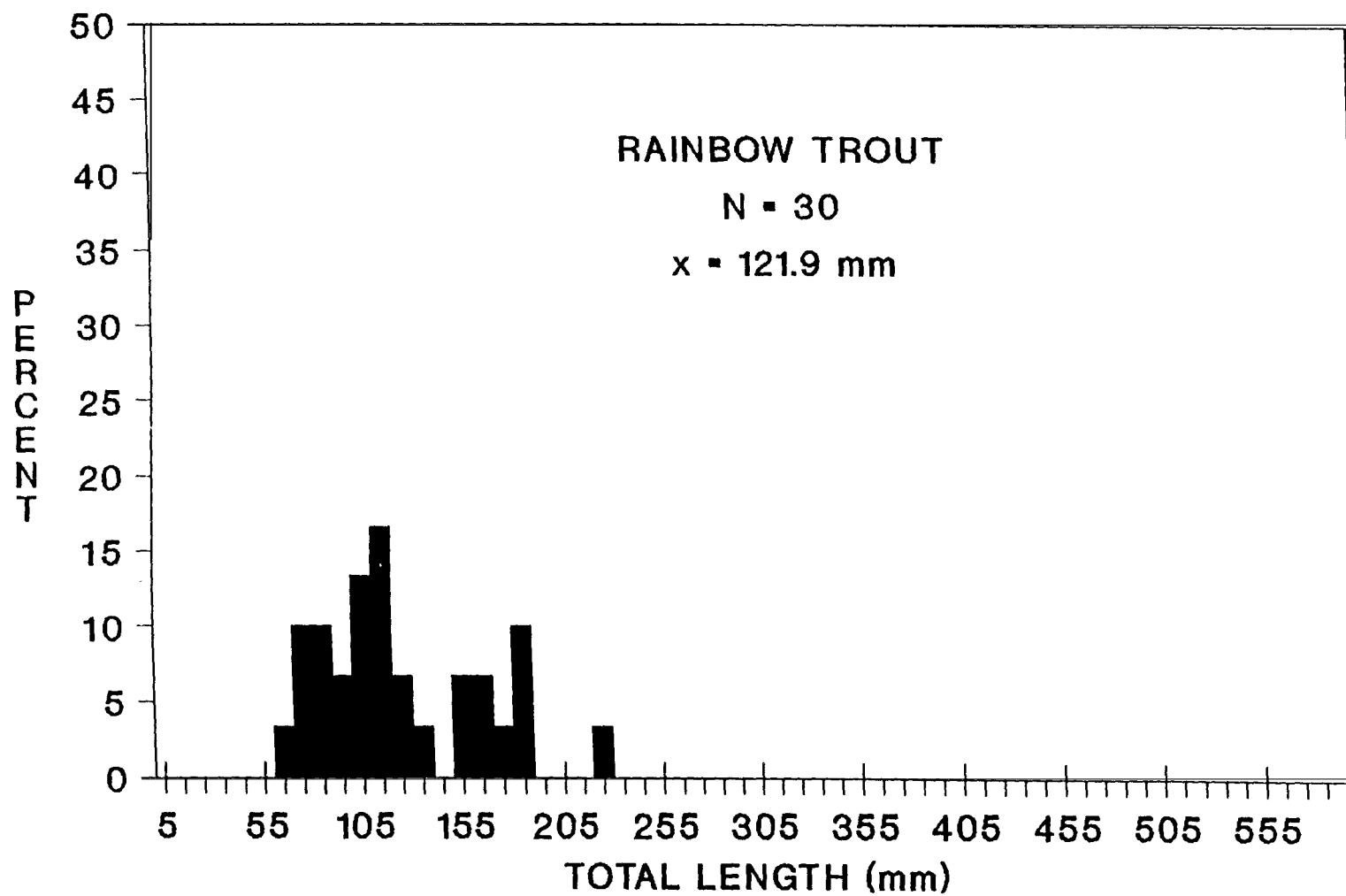


Figure 4. Length frequency of wild rainbow trout sampled by electrofishing in Copper Creek on May 20, 1991.

Table 11. Population estimates for brown and rainbow trout in the Bear Track Williams section of the Little Wood River, October 1991, and comparisons with previous brown trout population estimates.

Species	Number marked	Number caught	Number recaptured	Population estimate	S.E.	No/loom	No/100m ²
Size class (mm)							
Brown trout							
100-199	17	11	1	108	57	8.3	0.65
200-299	20	28	7	76	22	5.9	0.46
300-399	12	10	2	48	20	3.7	0.29
400-499	6	6	1	24	12	1.8	0.14
500-599	0	1	0	2	1	0.2	0.01
Total	-	-	-	258	65	19.9	1.55
Rainbow trout							
100-199	4	5	2	10	4	0.8	0.06
200-299	9	7	3	20	6	1.5	0.12
Total	-	-	-	30	7	2.3	0.18

Year	Mean length (mm)	Population ≥ 100 mm	Percent of pop. est.		No/100m	No/100m ²
			≥ 300 mm	≥ 400 mm		
1986 ^a	241	579	24	9	45	3.49
1987 ^b	258	329	18	2	25	1.98
1991	267	258	29	10	20	1.55

^a Thurow 1987.

^b Thurow 1988.

Table 12. Length frequency of trout sampled in the Bear Track Williams reach of the Little Wood River, October 1991.

Total length (mm)	Brown trout	Rainbow trout
100		
110		
120	1	
130		
140	3	
150	6	
160	8	
170	3	1
180	2	5
190	5	3
200	2	2
210	3	2
220	10	4
230	7	2
240	9	2
250	10	2
260		2
270	3	
280	4	
290		
300	2	
310	1	
320	1	
330	2	
340	2	
350	4	
360	2	
370	2	
380	3	
390	3	
400		
410	1	
420	6	
430	1	
440	3	
450	1	
460		
470		
480		
490		
500		
510	1	
Total	111	25
Mean	267.0	215.2

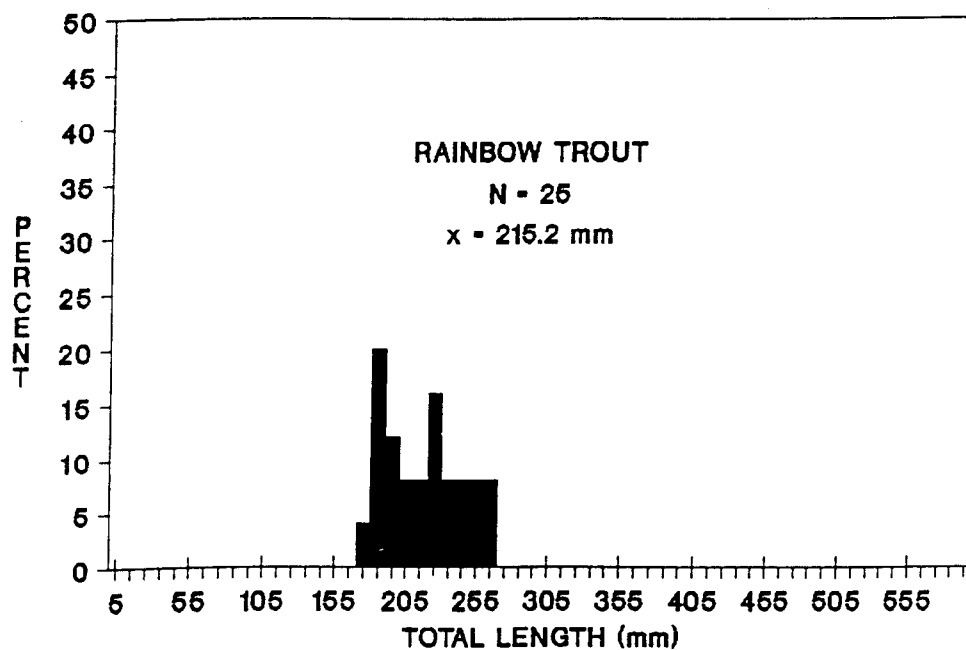
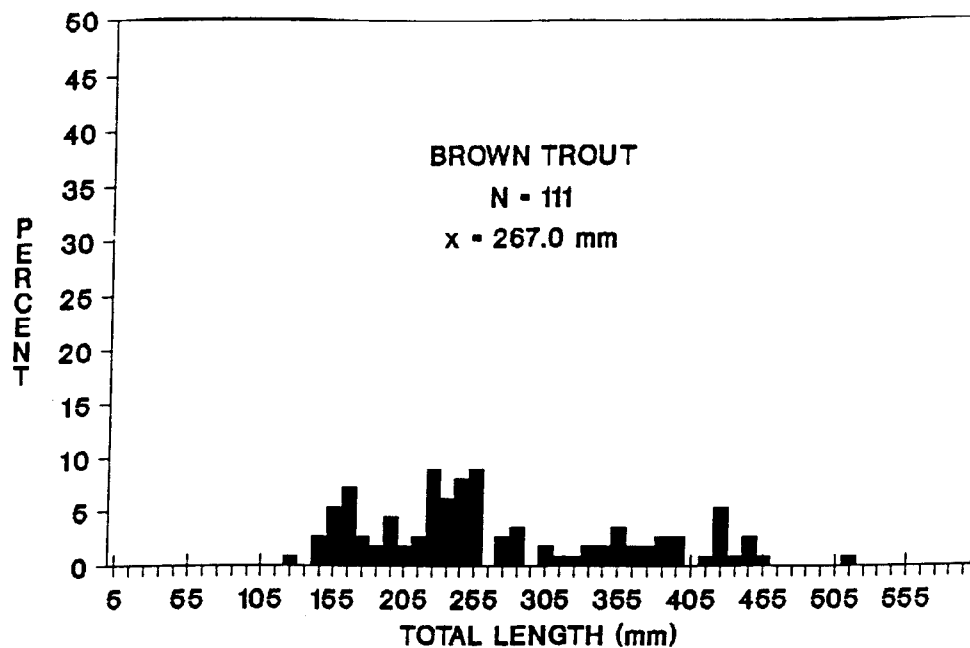


Figure 5. Length frequencies of brown and rainbow trout sampled by electrofishing in the Little Wood River during October 1991.

Table 13. Habitat data collected at Malad River below Highway 30 on July 8, 1991.

Channel Type	Confined
Mean Width (m)	21.8
Mean Depth (cm)	30.5
Habitat (%)	
Pool	0
Run	38
Pocke Water	50
Riffle	12
Back Water	0
Substrate Class (%)	
Sand	5
Gravel	24
Rubble	20
Boulder	51
Bedrock	0
Section Length (m)	425

A total of 1,257 wild and 5 hatchery rainbow trout were sampled in both the mark and recapture runs. Additionally, one yellow perch Perca flavescens, sculpin Cottus sp., largescale sucker Catostomus macrocheilus, and longnose dace Rhinichthys cataractae were present. The estimated population of wild rainbow trout greater than 100 mm was 2,367 fish (Table 14). Density estimates were 26 wild rainbow trout/100 m² and 557/100 m of stream.

Wild rainbow trout ranged from 37 mm to 426 mm, with a mean length of 178 mm (Figure 6). A sample (N = 29) of wild rainbow trout from 118 mm to 365 mm was weighed with a mean of 122 g and a mean condition (K) factor of 0.9385. Based on this mean weight, the standing stock of wild rainbow greater than 100 mm would be 317 kg/hectare. Hatchery rainbow trout ranged from 248 mm to 348 mm, mean 280 mm, and the yellow perch sampled was 224 mm.

Silver Creek

Fish populations in Silver Creek on Idaho Department of Fish and Game (IDFG) property northwest of Picabo, Idaho were evaluated during June and July 1991. Density estimates and size structure were determined by electrofishing prior to possible regulation changes. Electrofishing was performed with the aluminum drift boat and Coffelt shocking gear. A marking run (all trout \geq 150 mm) was made on June 26 and a recapture run on July 3. The sample reach was 2.6 km in length, extending from the USGS gauge station (Martin Bridge) downstream to the Point of Rocks access. The upper 1.4 km of the section is relatively narrow (19.8 m, Riehle et al. 1989) with a considerable amount of willows along the banks. The lower 1.2 km is wider (29.0 m), shallower, and more open. Total estimated area of the reach was 6.252 hectare.

From July 26 to November 14, 1991, water temperatures in Silver Creek near the Point of Rocks access area averaged 12.7°C, with a minimum temperature of 1.5°C and a maximum temperature of 21.6°C (Appendix A). At the railroad trestle 2.9 km upstream, mean temperature was 12.7°C, minimum 1.6°C, and maximum 22.6°C. Cooler maximum temperature downstream could be the result of additional shading from willows on IDFG property or possibly due to a small amount of inflow.

A total of 440 game fish consisting of 312 (70.9%) wild rainbow trout, 126 (28.6%) brown trout, and 2 (0.4%) mountain whitefish were sampled during the two shocking runs. Although not delineated, a majority of the trout were sampled in the narrower and deeper upper reach. Previous sampling in this area showed rainbow trout (wild and hatchery) accounting for 93% in 1976 and 83% in 1987 (Thurow 1978, Riehle 1989). Brown trout increased from 0% in 1976-77 to 21% in 1989. In addition to the game fish, all species were collected in approximately the first 200 m below Martin Bridge during the first run. A total of 335 fish were sampled with 50% being bridgelip sucker C. columbianus, 38% dace Rhinichthys sp., 7% reidside shiner Richardsonius balteatus, 4% wild rainbow trout, and 1% brown trout. In 1976, Thurow (1978) reported species composition as bridgelip sucker 49%, longnose dace 19%, reidside shiner 7%, Utah chub Gila atraria 0.1%, wild rainbow trout 16%, hatchery rainbow trout 7%, brook trout 0.6%, and mountain whitefish 1%.

An estimated 897 (1.43/100 m²) wild rainbow trout and 398 (0.64/100 m²) brown trout were in the sample reach (Table 15). Rainbow trout of 300 mm or greater accounted for 43% of the estimate, those 400 mm or greater accounted for 9%, and 0.4% were 500 mm or greater. Brown trout of 300 mm or greater accounted for 44% of the estimate, 32% were 400 mm or greater, 20% were 500 mm or greater, and 7% were 600 mm or greater. Riehle et al. (1989) also sampled portions of this reach in 1986 and 1987 and estimated densities of rainbow trout from 1.72 to 2.43/100 m² during the summer of 1986 (Table 16). Brown trout densities doubled from 0.30 in 1986 to 0.64/100 m² in 1991.

Table 14. Estimated wild rainbow trout densities in the Malad River below Highway 30 in March-April 1991.

Length group	Number			Population estimate	95% C.I.	Density	
	Marked	Caught	Recapture			Per 100m ²	Per 100m
100-149	104	86	8	1,015	596	11.0	238.8
150-199	206	149	47	647	149	7.0	152.2
200-249	138	134	49	375	82	4.0	88.2
250-299	60	66	19	204	73	2.2	48.0
300-349	26	32	8	99	52	1.1	23.3
350 ⁺	7	9	2	27	22	0.3	6.4
Total	-	-	-	2,367	626	25.5	556.9

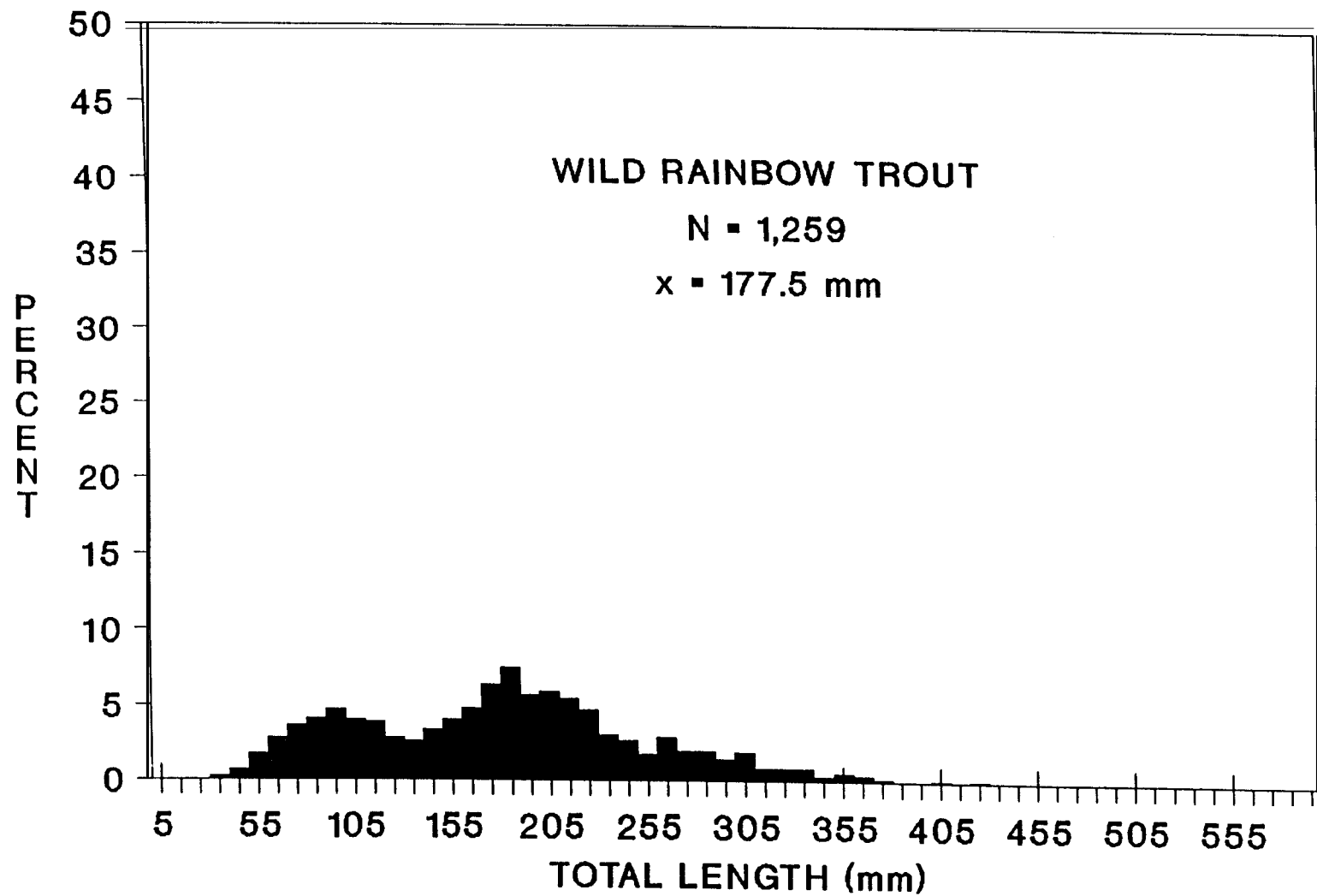


Figure 6. Length frequency of wild rainbow trout sampled by electrofishing in the Malad River in the spring, 1991.

Table 15. Population estimates for trout on Fish and Game property in Silver Creek, Summer 1991.

Species	Size class	Number marked	Number caught	Number recaptured	Population estimate	S.E.	No/loom	No/100m ²
Rainbow trout								
	150-199	23	36	1	444	249	17.1	0.71
	200-299	12	20	3	68	27	2.6	0.11
	300-399	63	103	21	302	56	11.6	0.48
	400-499	8	25	2	78	37	3.0	0.12
	500-599	0	3	0	4	2	0.2	0.01
	Total	-	-	-	897	372	34.5	1.43
Brown trout								
	150-199	0	0	0	-	-	-	-
	200-299	12	16	0	221	152	8.5	0.35
	300-399	14	19	5	50	16	1.9	0.08
	400-499	7	22	3	43	19	1.8	0.07
	500-599	7	19	2	53	24	2.0	0.08
	600-699	2	8	0	27	18	1.0	0.04
	Total	-	-	-	398	211	15.3	0.64

Table 16. Density estimates (number/100m²) for trout on Fish and Game property in Silver Creek. Values in parentheses are 95% confidence limits.

Site	Date	Rainbow trout	Brown trout
Martin Bridge ^a	Summer 1986	1.72 (0.97-2.94)	0.30 (0.19-0.47)
Martin Bridge ^a	Spring 1987	3.23 (2.35-4.43)	0.44 (0.33-0.57)
Point of Rocks ^a	Summer 1986	2.43 (1.11-4.51)	--
Fish and Game ^b	Summer 1991	1.43 (0.27-2.60)	0.64 (0.00-1.30)

^a Riekle et al 1989.

^b Includes both Martin Bridge, Point of Rocks and area in between.

Wild rainbow trout ranged from 100 mm to 515 mm, with a mean of 303 mm (Figure 7). Brown trout ranged from 205 mm to 690 mm, with a mean 412 mm. Nongame fish sampled ranged from 50 mm to 280 mm (Table 17). Length frequencies of sampled trout varied during 1977, 1986, and 1991; however, differences in electrofishing gear and methods (night sampling, 1986) may be the main reason. Even with these differences, it appears that there is a larger percentage of wild rainbow trout in the bigger size classes (> 300 mm) (Table 18). Brown trout showed a more even distribution of sizes in 1991, compared to 1986. The mean condition factor (K) of rainbow trout by size group ranged from 1.08 for fish smaller than 200 mm to 0.92 for fish larger than 500 mm (Table 19). Brown trout condition factors ranged from 1.19 to 0.96, respectively.

One of the brown trout jaw-tagged in October 1986 was sampled on July 3, 1991. When tagged, the fish was 495 mm and 1,350 g; when captured it was 565 mm and 1,900 g. The fish was in good condition (K = 1.05) and the jaw tag did not appear to have hampered its growth.

The most significant change in trout populations in Silver Creek is the continuing increase in brown trout numbers. However, there continues to be a significant amount of nongame forage for the large brown trout with no apparent changes in general fish composition. Lower densities of rainbow trout from 1986-87 could be from the lower percentage of small rainbow trout sampled. It is unknown if this decrease is because of sampling method (day versus night) or potential competition from increasing numbers of brown trout.

Snake River

Fish populations were sampled during the daytime in the Snake River below Lower Salmon Falls Dam in June 1991. The 2.2 km, 24 hectare reach between the dam and the Malad River (upper reach) was electrofished with the Smith-Root boat; and the 8.7 km, 87 hectare reach from the Malad River to Bliss Bridge (lower reach) was sampled with an aluminum drift boat and the Coffelt WP-15 unit. Population estimates were made by marking fish and recapturing them the following week. Except for northern squawfish Ptychocheilus oregonensis in the upper reach, only game fish were collected.

A total of 210 game fish were sampled in the upper reach and 155 in the lower reach (Table 20). Hatchery-origin rainbow trout (deformed fins) accounted for 65% and wild rainbow trout 19% of the sample in the upper reach, compared to 45% and 28%, respectively, the previous fall (Partridge and Corsi 1993). In the lower reach, hatchery rainbow trout accounted for only 38% and wild rainbow trout 59%, similar to the 42% and 51%, respectively, sampled in the lower end of this reach the previous fall. Other game fish sampled included brown trout, largemouth bass Micropterus salmoides, smallmouth bass M. dolomieu, bluegill Lepomis macrochirus, and yellow perch.

Recapture efficiency was low in both reaches with both boats ranging from 7% to 15% for rainbow trout in the upper reach and from 3% to 10% in the lower reach. Based on the limited recaptures, the estimated population of hatchery rainbow trout was 805 (34/hectare), and wild rainbow trout 100 (4/hectare) in the upper reach (Table 21). The previous fall, 638 (26/hectare) hatchery and 363 (15/hectare) wild rainbow trout were estimated in the upper reach. In the lower reach, there were an estimated 225 (4/hectare) hatchery rainbow trout and a combined estimate of 846 (15/hectare) total rainbow trout.

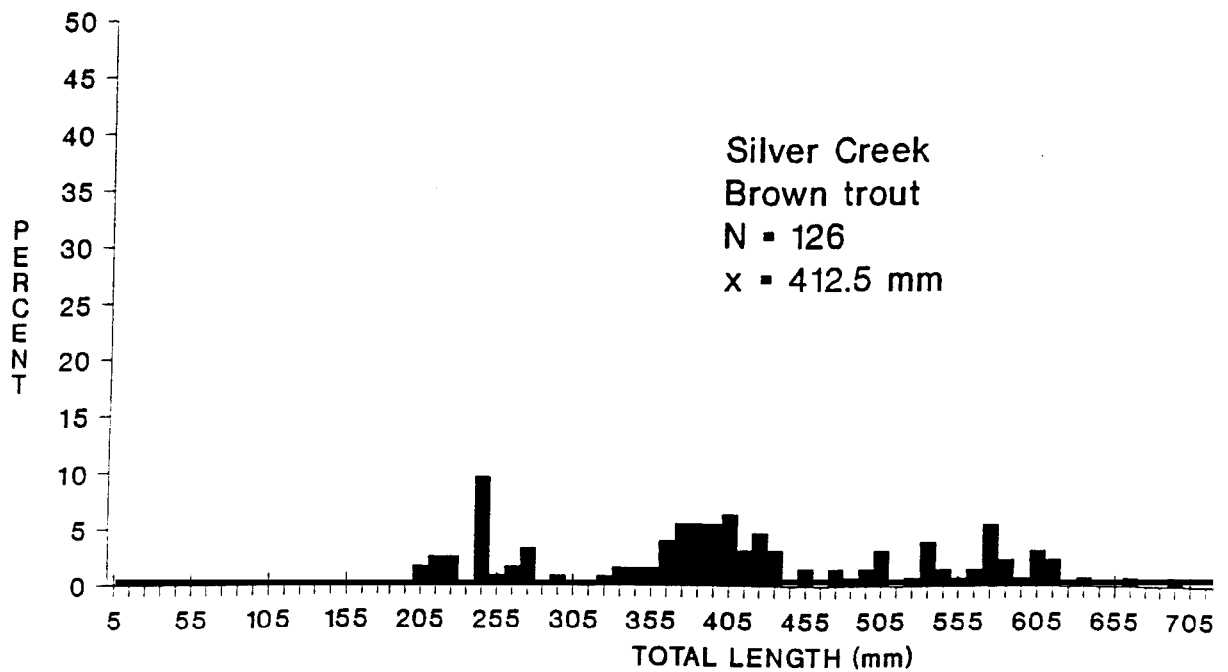
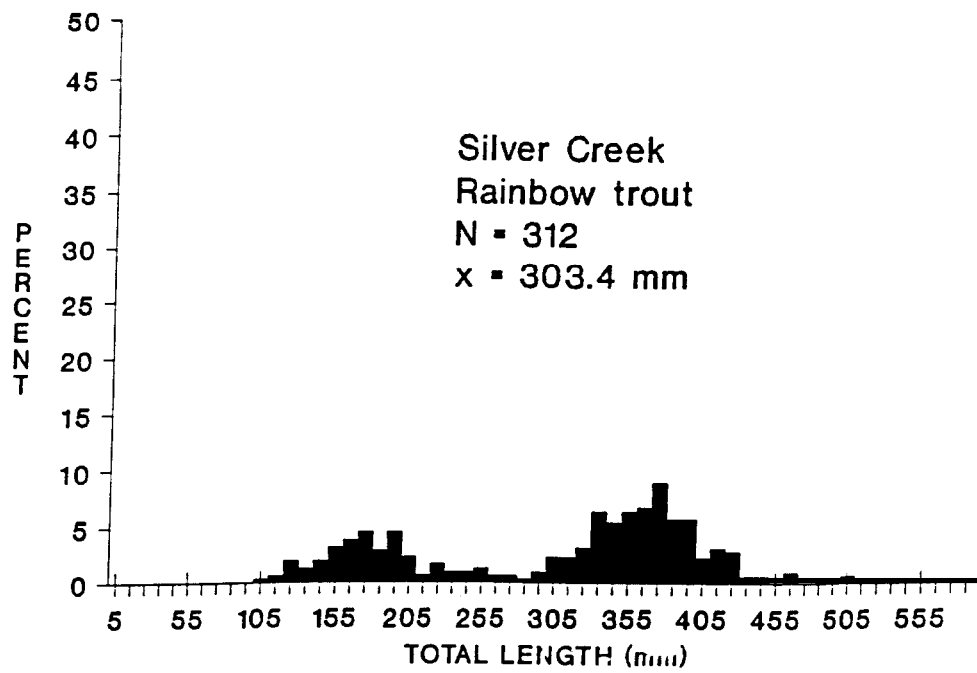


Figure 7. Length frequencies of rainbow and brown trout sampled by electrofishing in Silver Creek during summer, 1991.

Table 17. Length frequency of fish sampled in Silver Creek on the Fish and Game property, summer 1991.

Total length (mm)	Wild rainbow trout	Brown trout	Mountain whitefish	Bridgelip sucker	Redside shiner	Dace sp.
50						2
60						1
70					2	3
80			2		3	2
90				1	4	
100	1			2	1	
110	2			2		
120	6			5		
130	4			5	2	
140	6			8		
150	10			24		
160	12			19		
170	14			19		
180	9			15		
190	14			18		
200	7	2		13		
210	2	3		7		
220	5	3		8		
230	3			9		
240	3	12		4		
250	4	1		4		
260	2	2		4		
270	2	4		2		
280	1			1		
290	3	1				
300	7					
310	7					
320	10	1				
330	20	2				
340	17	2				
350	20	2				
360	21	5				
370	28	7				
380	18	7				
390	18	7				
400	7	8				
410	10	4				
420	9	6				
430	2	4				
440	2					
450		2				
460	3					
470		2				
480		1				
490		2				
500	1	4				

Table 17 continued.

Total length (mm)	Wild rainbow trout	Brown trout	Mountain whitefish	Bridgelip sucker	Redside shiner	Dace sp.
510	2					
520		1				
530		5				
540		2				
550		1				
560		2				
570		7				
580		3				
590		1				
600		4				
610		3				
620						
630		1				
640						
650						
660		1				
670						
680						
690		1				
700						
Total	312	126	2	170	12	8
Mean	303.4	412.5	80.0	182.2	94.1	68.1

Table 18. Length frequencies of trout from electrofishing samples from Silver Creek on the Fish and Game property.

Species/Date	Length class (mm)						Number
	100-199	200-299	300-399	400-499	500-599	600+	
Rainbow trout							
Fall 1977 ^a	22	50	24	4	0	0	105
Summer 1986 ^b	66	10	20	4	0	0	90
Summer 1991	25	10	53	10	1	0	312
Brown trout							
Summer 1986 ^b	0	13	13	51	18	5	39
Summer 1991	0	22	26	23	21	8	126

Thurrow 1978.

^a Riekle et al 1989.

Table 19. Condition factor (K) of trout in Silver Creek on the Fish and Game property, summer 1991.

Size class (mm)	Rainbow trout			Brown trout		
	Mean length	Mean condition	Sample number	Mean length	Mean condition	Sample number
100-199	180	1.08	3	-	-	0
200-299	278	1.04	3	-	-	0
300-399	362	1.02	15	359	1.19	4
400-499	428	0.99	7	438	1.23	7
500-599	515	0.92	1	541	1.06	16
600-699	-	-	0	628	0.96	8

Table 20. Number of fish collected while doing mark and recapture population estimates on the Snake River in 1991.

Species	LSFD - Malad River				Malad River - Bliss Bridge			
	6/4	6/12	Total	Percent	6/4-5	6/12	Total	Percent
Rainbow trout								
Wild	20	19	39	18.6	65	27	92	59.4
Hatchery	50	52	102	48.6	24	16	40	25.8
91-Hayspur	13	14	27	12.9	6	4	10	6.4
91-Erwin	4	2	6	2.8			0	0
90-Spokane			0	0		3	3	1.9
90-Kamloops		1	1	0.5			0	0
90-X Cutthroat hybrid			0		1	5	6	3.9
Brown trout	2	2	4	1.9			0	
Coho salmon			0		1		1	0.6
Mountain whitefish		1	1	0.5			0	
Largemouth bass	3	3	6	2.9			0	
Smallmouth bass	5	4	9	4.3	1		1	0.6
Bluegill	3	2	5	2.4			0	
Yellow perch	7	3	10	4.8	1	1	2	1.3
Total gamefish	107	103	210		99	56	155	
Northern squawfish	18	21	39	-	-	-	-	-

Table 21. Population estimates for game fish (≥ 150 mm) in the Snake River below Lower Salmon Falls Dam, June 1991

Area/species	Number marked	Number caught	Number recaptured	Population estimate	S.E.	No./ km	No./ ha
<u>Lower Salmon Dam to Malad River</u>							
Rainbow trout-hatchery	60	65	4	805	316	366	34
Rainbow trout-wild	20	18	3	100	40	45	4
Rainbow trout-total	80	83	7	850	270	386	35
Brown trout	2	2	0	I.D. ^a	-	-	-
Largemouth bass	3	3	0	I.D.	-	-	-
Smallmouth bass	5	4	2	I.D.	-	-	-
Bluegill	1	1	0	I.D.	-	-	-
Yellow perch	7	3	1	I.D.	-	-	-
Northern squawfish	16	18	1	I.D.	-	-	-
<u>Ma River to Bliss Bridge</u>							
Rainbow trout-hatchery	31	28	3	225	93	26.0	4
Rainbow trout-wild	62	25	2	I.D.	-	-	-
Rainbow trout-total	93	53	5	846	301	98	15
Smallmouth bass	1	0	0	I.D.	-	-	-
Yellow perch	1	1	0	I.D.	-	-	-

^a Insufficient data.

Three groups of marked fingerling rainbow trout or hybrids were released into the Snake River in 1990. The Lower Salmon Falls Dam to Bliss Bridge area received 8,000 Spokane (adipose fin-clipped, 88 mm) and 10,000 Kamloops (right ventral-clipped, 80 mm) on May 19 (Partridge and Corsi 1993). On October 19, 10,000 rainbow x cutthroat hybrids (101 mm) were released at the Bliss Bridge. Recaptures from these groups accounted for 1.5% (Spokane), 0.5% (Kamloops), and 3.1% rainbow x cutthroat hybrids of the hatchery rainbow trout sampled. Based on these recapture percentages and the combined hatchery rainbow trout population estimate (1,030), 0.2%, 0.03%, and 0.3% of the releases, respectively, were estimated to be in this reach in June 1991. Some of the factors affecting estimated survival include loss of marks, predation, and emigration, partially as a result of daily fluctuation of river flows below Lower Salmon Falls Dam (Partridge and Corsi 1993).

Two other marked groups of hatchery rainbow trout were present in the river below Lower Salmon Falls Dam in June 1991. These groups were released in Lower Salmon Falls Reservoir on February 21 (15,477 adipose fin-clipped Hayspur strain with a mean length of 182 mm) and on May 22 (1,300 tagged Erwin strain with a mean length of 185 mm) (see Job 4-b, this report). Survivors of marked fish emigrating from the reservoir accounted for 19.0% (Hayspur) and 3.1% (Erwin) of the hatchery rainbow trout sampled. The estimated 195 Hayspur strain accounted for 1.3% of the release and the estimated 32 Erwin 2.5%. Other hatchery rainbow trout sampled in the river either originated in the reservoir, the Malad River, or were escapees from hatcheries adjacent to the river.

Growth of hatchery releases in the river continued to be good with Spokane rainbow trout averaging 350 mm in June (Table 22). These fish averaged 127 mm in June and July 1990, and 246 mm in October and November 1990 (Partridge and Corsi 1993). Kamloops averaged 124 mm in summer, 222 in fall, and 315 in June 1991. Rainbow x cutthroat were sampled at 109 mm in October 1990, and at 258 mm in June 1991. Hayspur rainbow trout had a mean length of 250 mm and Erwin 191 mm. The combined hatchery rainbow trout sampled in the upper reach above the Malad River ranged from 130 mm to 420 mm, with a mean length of 224 mm, compared to a range of 190 mm to 460 mm and a mean of 315 mm in the lower reach (Table 23). The smaller average size in the upper reach is partially due to emigration from the reservoir of the May stocking of 11,900 Erwin rainbow trout with a mean length of 185 mm. Wild rainbow trout had a mean length of 291 mm in the upper reach and 320 mm in the lower reach (Figure 8). Wild rainbow trout up to 460 mm were sampled. Lengths of other fish sampled are presented in Table 24.

Water temperatures in the Snake River just below Lower Salmon Falls Dam averaged 9.7°C, with a minimum of 3.6°C and a maximum of 14.2°C during the period of December 11, 1990 to April 10, 1991 (Appendix B). At the pump station below the Bliss Bridge, 12.3 km downstream, water temperatures averaged 10.5°C, with a minimum of 5.9°C and a maximum of 14.5°C during this same period. During the period of April 13 to July 7, 1991, the mean water temperature at the pump was 15.1°C, with a minimum of 11.1°C and a maximum of 19.2°C. River water temperatures in this reach are modified by inflow from the Malad River and by numerous springs, both in the Malad River and along the Snake River.

South Fork Boise River

The South Fork Boise River above Anderson Ranch Reservoir flows mainly through U.S. Forest Service lands in Elmore and Camas counties. Access from Featherville to Big Smokey Creek is good by a graded gravel road adjacent to the river and six developed campgrounds in this 36 km reach (Partridge et al. 1990). The river lies in the southern end of the Idaho batholith and, as a result, is low in productivity with water conductivity ranging from 110 to 120 in August 1991 (Partridge and Corsi 1993).

Table 22. Length frequency of marked rainbow trout strains and rainbow x cutthroat hybrids in the Snake River, June 1991.

Total length (mm)	Spokane ^a rainbow	Kamloops ^b rainbow	Rainbow ^c cutthroat	Hayspur ^d rainbow	Erwin ^e rainbow
100					
110					
120					
130					
140					
150					
160					1
170				1	
180					1
190					2
200				3	1
210				1	1
220				3	
230			1	3	
240			3	5	
250				6	
260				6	
270				5	
280			1	2	
290			1		
300				2	
310	1	1			
320					
330	1				
340					
350					
360					
370					
380					
390					
400	1				
410					
420					
430					
440					
450					
460					
470					
480					

Table 22 continued.

Total length (mm)					
	rainbow	Kamloops ^b rainbow	Rainbow ^c cutthroat	Hayspur ^d rainbow	Erwin ^e rainbow
490					
500					
Total	3	1	6	37	6
Mean	350	315	258	250	191
^a Released in Snake River, May 19, 1990 at 130/kg (approx. 88 mm). ^b Released in Snake River, May 19, 1990 at 176/kg (approx. 80 mm). ^c Released in Snake River, October 19, 1990 at 88/kg (approx. 101 mm). ^d Released in L.S.F. Reservoir, February 21, 1991 at 10.2/kg (x=182 mm). ^e Released in L.S.F. Reservoir, May 22, 1991 at 11.7/kg (x=185 mm).					

Table 23. Length frequency of rainbow trout in the Snake River below Lower Salmon Falls Dam, June 1991.

Total length (mm)	LSFD to Malad River		Malad River to Bliss Bridge	
	Hatchery ^a	Wild	Hatchery ^a	Wild
50				
60				
70				
80				1
90				
100				
110				1
120				
130	3			1
140	1	1		2
150	2			1
160	7	1		
170	7			2
180	12			
190	15		1	
200	18		1	3
210	14		1	
220	10		2	2
230	4	2	1	
240	6	2	3	3
250	5	2	2	1
260	5	2	2	4
270	6	5	3	4
280	1	2	4	9
290	5	7	4	5
300	3	2	5	5
310	2	5	5	5
320	3		5	2
330	2	2	1	5
340		1	2	1
350	3	1	5	4
360			1	4
370		2	2	1
380			1	3
390			2	1
400	1	2	1	3
410			1	3
420	1		2	1
430				7
440			1	3

Table 23 continued.

Total length (mm)	<u>LSFD to Malad River</u>		<u>Malad River to Bliss Bridge</u>	
	<u>Hatchery^a</u>	<u>Wild</u>	<u>Hatchery^a</u>	<u>Wild</u>
450				3
460			1	2
470				
480				
490				
500				
Total	136	39	59	92
Mean	224.3	290.6	314.6	320.3

^a Includes all marked rainbow trout and hybrids.

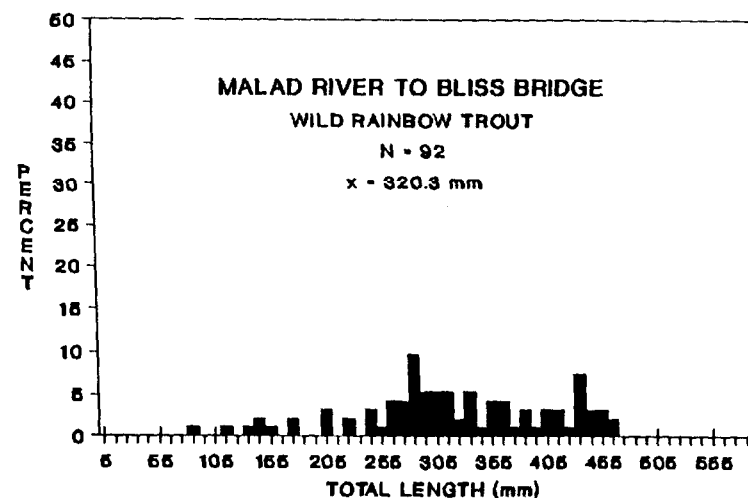
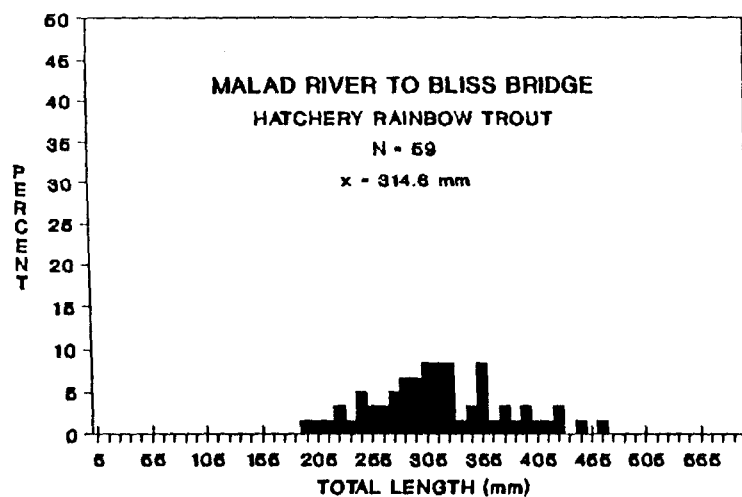
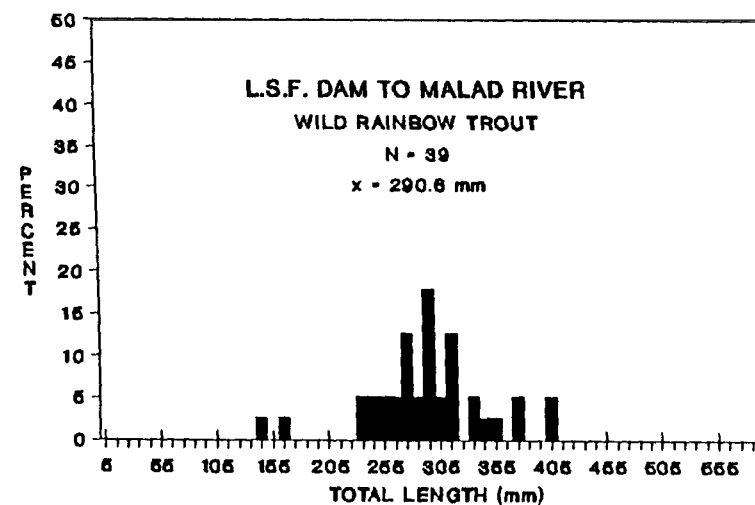
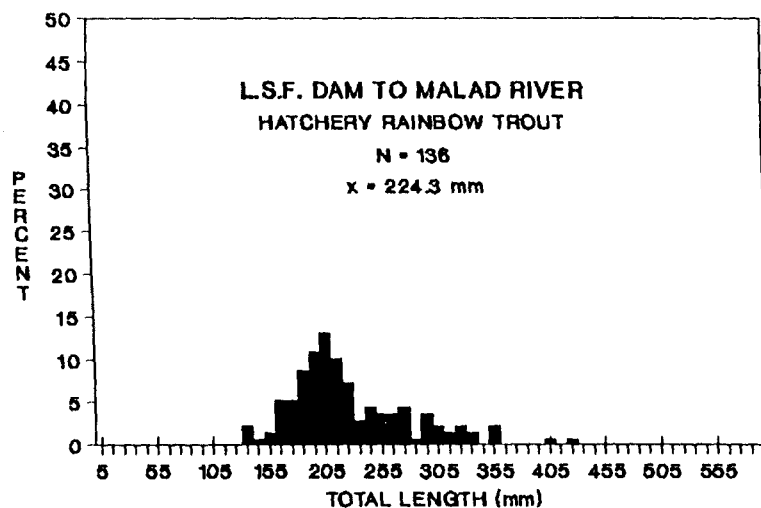


Figure 8. Length frequencies of hatchery and wild rainbow trout sampled by electrofishing in the Snake River in the summer, 1991.

Table 24. Length frequency of fish, other than rainbow trout, in the Snake River below Lower Salmon Falls Reservoir, June 1991.

Total length (mm)	Coho salmon	Brown trout	Largemouth bass	Smallmouth bass	Yellow perch	Bluegill	Mountain whitefish	Northern squawfish
100								
110								
120						1		1
130						1		2
140						1		2
150						2		
160								1
170	1		1		4			
180					1			
190			2		1			
200								
210					2			2
220			1		1			2
230					2			1
240					1			
250								
260			1					2
270								2
280				1				1
290								
300				3				2
310								2
320			1	1				3
330				3				1
340								4
350				1			1	2
360				1				1
370		2						2
380								1
390								
400								
410								
420		1						
430								2
440								1
450								
460		1						
470								
480								
490								
500								

Table 24 continued.

Total length (mm)	Coho salmon	Brown trout	Largemouth bass	Smallmouth bass	Yellow perch	Bluegill	Mountain whitefish	Northern squawfish
510								
520								1
530								
540								
550								1
Total	1	4	6	10	12	5	1	39
Mean	178	408	226	322	201	140	355	301

Fish and stream habitat were sampled in the upper portion of the South Fork Boise River in August 1991 to determine the presence of bull trout Salvelinus confluentus and the status of the wild rainbow trout population. A 1,508 m section of river immediately above Deadwood Creek (NW 1/4, Sec 23, T3N, R12E) was electrofished with a canoe and the Coffelt electrofishing gear to mark fish on August 6, 1991. Fish were recaptured on August 12, 1991. All game fish of 100 mm or greater were marked.

The mean width of the sample reach was 22.3 m and average depth was 33.8 cm (Table 25). Based on transects 100 m apart, run type habitat accounted for 80%, with pool and riffle accounting for 10% each. However, one series of large boulders in a rapids created several areas of pocket water. Rubble and gravel accounted for 62% of the substrate.

A total of 188 wild and 186 hatchery rainbow trout, 10 bull trout, and 312 mountain whitefish were sampled in both runs. Other species observed but not always collected included longnose dace, mountain sucker Catostomus platyrhynchus, and sculpin sp. Population estimates were not attempted on hatchery trout due to the upstream movement of the 35,000 Eagle Lake fingerlings, which were released on August 1, 1991 below the survey reach. Other hatchery trout included two adipose fin-clipped catchables released upstream in Big Smokey Creek. A total of 6 hatchery trout were sampled on August 6, and 180 on August 12. An estimated 542 (1.41/100 m²) wild rainbow trout were in the shocking area with 12% being of 200 mm or greater, and 0.4% being of 300 mm or greater (Table 26). An estimated 1,020 (3.03/100 m²) mountain whitefish were in the reach. The bull trout population estimate was nine (0.03/100 m²).

Wild rainbow trout ranged from 80 mm to 320 mm, with a mean of 155 mm (Figure 9). Bull trout up to 330 mm were sampled with the mean being 232 mm (Table 27). Mountain whitefish ranged from 85 mm to 485 mm, with a mean of 254 mm.

Angler Questionnaire

A questionnaire was given to anglers along the South Fork Boise River above Anderson Ranch Reservoir and at public meetings during the summer of 1991 to determine their preferred management direction. Anglers supported ($\geq 80\%$) reducing bag limits and imposing size restrictions in a wild trout section of the river, but were less favorable of gear restrictions or catch-and-release only regulations (Appendix C). The most preferred size of a special wild trout water was 16 km to 24 km.

Vineyard Creek

Vineyard Creek lies on the north side of the Snake River, 0.8 km above Twin Falls (Sec 4, T10S, R18E). Water in the creek primarily originates in springs which form Vineyard Lake then descend over the falls in the creek, which is about 400 m long. About halfway to the river, an irrigation drain also enters the creek. On September 6, 1991, Vineyard Creek was sampled with the backpack electrofisher to determine species composition in conjunction with a water quality study by the Division of Environmental Quality. The stream was subdivided into two reaches above and below the irrigation drain, each approximately 200 m in length.

A total of 28 fish were sampled below the drain. Based on visual examination, there were four cutthroat trout Oncorhynchus clarki, two rainbow x cutthroat hybrids, four wild rainbow trout, two common carp Cyprinus carpio, one smallmouth bass, eight redbreast shiner, six speckled dace Rhinichthys osculus, and one sucker Catostomus sp. Thirty fish were sampled above the drain consisting of 13 sucker sp., 9 cutthroat trout, 2 rainbow x cutthroat hybrids, and 6 wild rainbow trout. Cutthroat trout ranged from 95 mm to 170 mm, with a mean length of 135 mm, and rainbow trout 115 mm to 475 mm, with a mean of 236 mm (Table 28).

Table 25. Habitat data collected at South Fork Boise River, August 16, 1991.

Deadwood reach	
Channel Type	Confined
Mean Width (m)	22.3
Mean Depth (cm)	33.8
Habitat (%)	
Pool	10
Run	80
Pocket Water	0
Riffle	10
Back Water	0
Substrate Class (X)	
Sand	7
Gravel	18
Rubble	44
Boulder	31
Bedrock	0
Section Length (m)	1,508
Section Area (ha)	3.36

Table 26. Population estimates for game fish^a (> 100 mm) in the South Fork of the Boise River above Deadwood Creek, August 1991.

Species Size Class (mm)	Number marked	Number caught	Number recaptured	Population estimate	S.E.	No/ loom	No/ 100m ²
Wild rainbow trout							
100-199	53	87	9	475	135	31.5	1.41
200-299	13	22	4	64	23	4.2	0.19
300-399	1	0	0	2	-	0.1	0.01
Total	-	-	-	542	137	35.9	1.61
Mountain whitefish							
100-199	53	65	4	713	28	47.3	2.12
200-299	21	19	4	88	31	5.8	0.26
300-399	70	62	20	213	37	14.1	0.63
400-499	3	2	1	6	2	0.4	0.02
Total	-	-	-	1,020	284	67.6	3.03
Bull trout	2	8	2	9	4	0.6	0.03
^a Hatchery rainbow trout not estimated due to upstream movement of recent fingerling releases.							

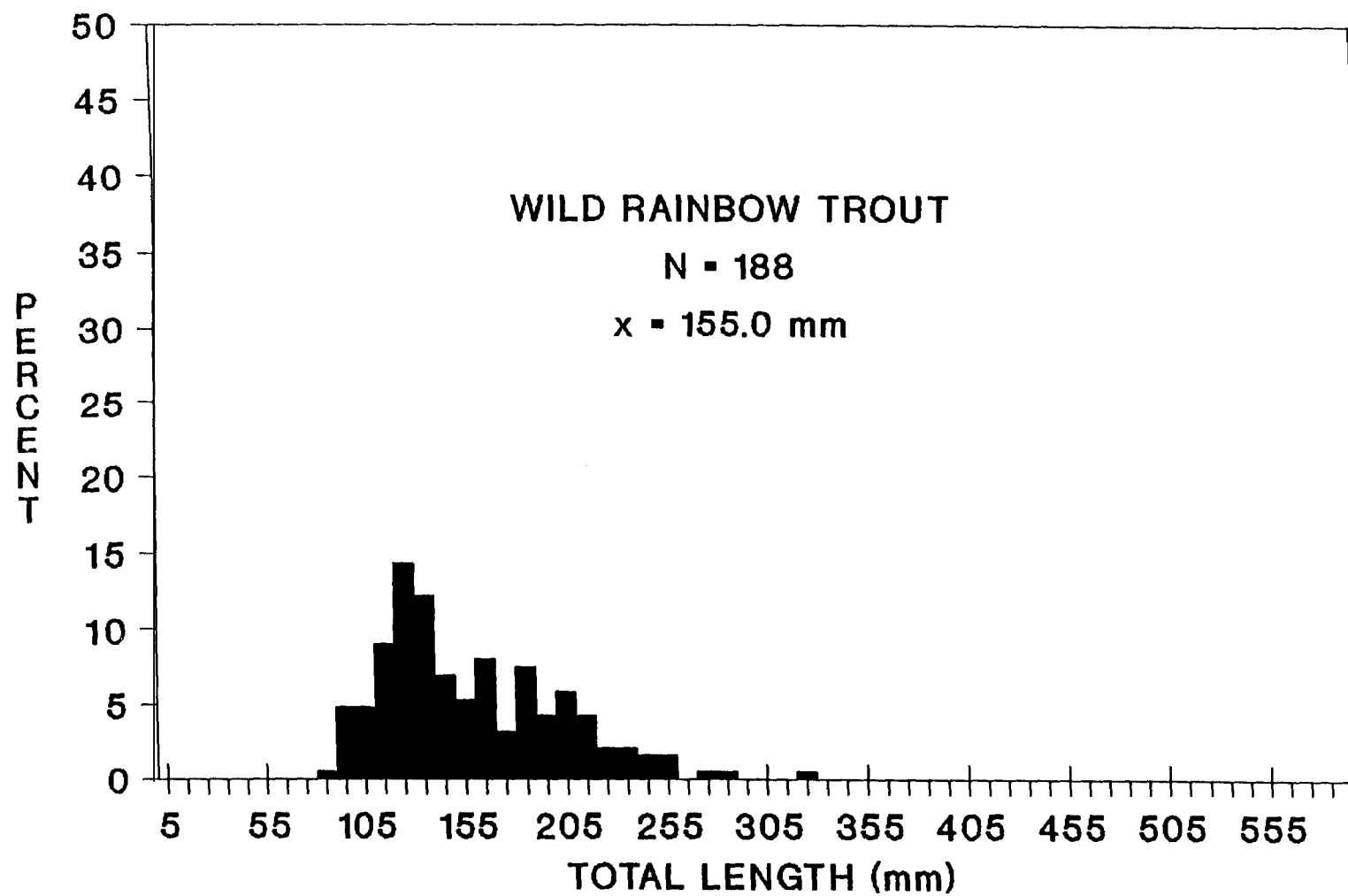


Figure 9. Length frequency of wild rainbow trout sampled by electrofishing in the South Fork Boise River during August 1991.

Table 27. Length frequency of fish sampled above Deadwood Creek in the South Fork Boise River in August 1991.

Total length (mm)	Wild rainbow trout	Hatchery rainbow trout	Bull trout	Mountain whitefish
60				
70				4
80	1			
90	9	12		
100	9	36		
110	17	52		
120	27	51		2
130	23	17		3
140	13	8		2
150	10			21
160	15			43
170	6	1		33
180	14			16
190	8	1	1	8
200	11	1	3	7
210	8	4	3	6
220	4	2	1	3
230	4	1		2
240	3			2
250	3			4
260				6
270	1			8
280	1			2
290				3
300				8
310				9
320	1			23
330			2	18
340				25
350				24
360				11
370				7
380				4
390				3
400				2
410				
420				1
430				
440				
450				
460				
470				
480				2
490				
Total	188	186	10	312
Mean	155.0	120.2	232.5	254.0

Table 28. Length frequency of fish sampled in Vineyard Creek on September 6, 1991.

Total Length (mm)	Cutthroat trout	Rainbow trout	Rainbow x cutthroat	Smallmouth bass	Common carp	Sucker sp.	Redside shiner	Speckled dace
50								
60								
70								3
80								1
90	1						1	2
100							4	
110	2	1					1	
120	1		2					
130	2					1	1	
140	4		1					
150	2	1	1				1	
160		1						
170	1	2						
180								
190								
200				1				
210								
220								
230								
240								
250		2						
260		1						
270						1		
280								
290						1		
300								
310								
320								
330								
340		1						
350								
360						1		
370						1		
380						1		
390						1		
400						3		
410						1		
420								
430						1		
440					2	1		
450								
460								
470		1						
480						1		
490								
500								
Total	13	10	4	1	2	14	8	6
Mean	135.0	236.5	133.8	200	440.0	368.9	110.6	80.0

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A P P E N D I C E S

Appendix A. Maximum, minimum, and mean daily water temperatures in Silver Creek, Idaho during July through November 1991.

Date	Railroad bridge west of Picabo			Point of Rocks		
	Daily temperatures (°C)			Daily temperatures (°C)		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
07/26/91	20.8	14.8	17.6	20.3	15.0	17.7
07/27/91	22.2	15.6	18.5	21.4	15.3	18.4
07/28/91	22.3	15.3	18.6	21.4	15.3	18.5
07/29/91	21.4	16.6	18.9	20.7	16.4	18.8
07/30/91	22.6	15.9	18.8	21.6	15.7	18.7
07/31/91	20.8	16.2	18.4	20.1	15.9	18.4
08/01/91	20.8	16.7	18.4	20.2	16.5	18.4
08/02/91	21.0	14.5	17.4	20.2	14.2	17.3
08/03/91	21.0	15.3	17.7	20.2	14.8	17.7
08/04/91	20.2	16.2	17.7	19.6	16.0	17.7
08/05/91	21.1	15.9	18.0	20.5	15.6	18.1
08/06/91	20.6	15.7	18.0	20.5	15.5	18.0
08/07/91	21.2	16.4	18.6	20.8	16.2	18.5
08/08/91	22.0	16.0	18.8	21.4	16.0	18.8
08/09/91	22.1	16.2	18.9	21.5	16.0	18.9
08/10/91	21.4	16.7	18.8	20.8	16.4	18.8
08/11/91	21.4	16.0	18.4	20.6	15.8	18.4
08/12/91	20.6	14.8	17.5	19.6	15.0	17.6
08/13/91	20.2	14.9	17.3	19.4	14.7	17.4
08/14/91	20.6	15.9	17.9	19.9	15.6	17.9
08/15/91	20.7	16.0	17.9	20.1	15.7	17.9
08/16/91	19.8	16.5	17.9	19.5	16.3	18.0
08/17/91	21.1	15.3	17.9	20.5	15.4	18.0
08/18/91	20.1	15.9	17.8	19.6	15.6	17.9
08/19/91	19.9	15.9	17.6	19.2	15.6	17.6
08/20/91	19.6	14.7	17.0	19.3	15.0	17.2
08/21/91	20.2	15.0	17.4	19.9	15.3	17.7
08/22/91	20.5	15.6	17.8	20.3	15.9	18.2
08/23/91	19.6	15.9	17.6	19.5	16.1	18.0
08/24/91	18.3	14.2	16.2	18.4	14.6	16.7
08/25/91	18.7	14.5	16.4	18.9	14.7	16.8
08/26/91	20.6	15.3	17.6	20.5	15.6	18.0
08/27/91	18.9	16.4	17.8	19.6	17.1	18.2
08/28/91	17.4	13.9	15.7	17.3	14.4	15.9
08/29/91	18.3	12.8	15.4	17.7	12.9	15.4
08/30/91	18.3	14.0	16.0	17.7	13.8	16.0
08/31/91	16.3	13.3	14.4	16.4	13.6	14.5

Appendix A. Continued.

Railroad bridge west of Picabo				Point of Rocks		
Date	Daily temperatures (°C)			Daily temperatures (°C)		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
09/01/91	18.1	11.9	14.6	17.3	12.2	14.6
09/02/91	18.6	13.6	15.7	18.0	13.4	15.7
09/03/91	18.9	13.6	15.9	18.3	13.3	15.9
09/04/91	19.2	13.7	16.2	18.5	13.6	16.2
09/05/91	19.9	14.1	16.7	19.0	14.0	16.6
09/06/91	19.8	14.1	16.6	18.8	14.0	16.6
09/07/91	17.4	14.6	15.8	17.2	14.3	15.9
09/08/91	16.9	13.6	14.9	16.5	13.5	15.0
09/09/91	14.4	12.6	13.3	14.9	12.8	13.5
09/10/91	14.7	11.3	12.9	14.4	11.5	13.0
09/11/91	13.8	11.9	12.8	14.1	12.0	13.0
09/12/91	15.1	11.3	13.1	15.1	11.6	13.3
09/13/91	15.8	11.9	13.7	15.6	12.1	13.8
09/14/91	15.3	11.3	13.3	14.7	11.8	13.4
09/15/91	14.8	10.6	12.6	14.7	10.9	12.9
09/16/91	15.2	10.5	12.7	14.9	10.6	12.9
09/17/91	16.1	11.4	13.6	15.9	11.6	13.8
09/18/91	15.6	11.5	13.5	15.6	11.8	13.8
09/19/91	16.1	11.4	13.7	15.9	11.8	13.9
09/20/91	16.2	11.8	13.8	16.0	11.9	14.1
09/21/91	14.1	10.8	12.5	14.4	11.1	12.7
09/22/91	12.8	9.2	11.0	12.8	9.4	11.1
09/23/91	13.3	9.2	11.2	13.3	9.4	11.3
09/24/91	13.9	10.2	12.0	14.1	10.0	12.0
09/25/91	15.2	10.8	12.9	15.0	11.0	13.0
09/26/91	15.6	11.3	13.4	15.4	11.6	13.6
09/27/91	15.0	11.7	13.4	15.0	11.9	13.5
09/28/91	15.6	12.8	14.0	15.8	12.9	14.2
09/29/91	15.2	12.4	13.7	15.3	12.4	13.9
09/30/91	15.2	11.4	13.3	15.0	11.8	13.5
10/01/91	14.9	11.4	13.0	14.8	11.7	13.2
10/02/91	13.8	10.4	12.0	13.8	10.7	12.2
10/03/91	12.2	9.2	10.6	12.1	9.3	10.7
10/04/91	11.3	7.6	9.5	11.0	7.9	9.6
10/05/91	11.4	7.4	9.4	11.1	7.5	9.4
10/06/91	12.1	8.1	10.0	11.8	8.1	10.1
10/07/91	12.3	9.2	10.6	11.9	9.2	10.6
10/08/91	12.6	8.6	10.5	12.2	8.8	10.6

Appendix A. Continued.

Railroad bridge west of Picabo				Point of Rocks		
Date	Daily temperatures (°C)			Daily temperatures (°C)		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
10/09/91	13.1	9.1	11.0	12.8	9.2	11.1
10/10/91	13.8	9.8	11.7	13.5	10.0	11.8
10/11/91	13.9	10.1	12.0	13.8	10.3	12.1
10/12/91	13.1	9.4	11.3	12.6	9.9	11.4
10/13/91	12.2	8.7	10.4	12.0	8.9	10.5
10/14/91	11.9	8.6	10.2	11.8	8.8	10.3
10/15/91	12.5	8.6	10.5	12.1	8.8	10.6
10/16/91	12.0	8.9	10.5	11.8	9.0	10.6
10/17/91	11.1	8.5	10.1	11.1	8.7	10.2
10/18/91	8.7	5.9	7.4	8.5	5.8	7.4
10/19/91	9.4	6.3	7.8	9.3	6.2	7.7
10/20/91	10.1	6.5	8.2	9.7	6.5	8.2
10/21/91	10.5	7.1	8.8	10.3	7.0	8.8
10/22/91	9.6	7.9	8.8	9.6	8.0	8.8
10/23/91	7.9	5.8	7.0	7.9	5.7	7.0
10/24/91	6.0	4.0	5.1	5.7	4.1	5.0
10/25/91	6.8	4.8	5.8	6.6	4.6	5.6
10/26/91	6.8	6.1	6.4	6.8	6.0	6.3
10/27/91	6.7	4.9	5.8	6.4	4.9	5.7
10/28/91	5.9	4.1	5.0	5.6	4.0	4.8
10/29/91	5.3	3.3	4.2	4.9	3.1	4.1
10/30/91	3.4	2.1	2.8	3.1	2.0	2.6
10/31/91	4.7	2.6	3.5	4.4	2.2	3.3
11/01/91	4.6	3.4	4.2	4.5	3.3	4.0
11/02/91	4.8	2.1	3.3	4.6	2.0	3.2
11/03/91	3.2	1.6	2.4	2.7	1.5	2.1
11/04/91	4.6	2.1	3.2	4.2	1.9	2.9
11/05/91	6.0	4.4	5.1	5.7	3.9	4.8
11/06/91	8.1	5.5	6.7	7.8	5.2	6.5
11/07/91	8.1	6.3	7.1	7.8	6.4	7.1
11/08/91	7.8	5.3	6.5	7.5	5.3	6.5
11/09/91	9.6	7.4	8.2	9.4	7.1	8.1
11/10/91	9.2	8.1	8.7	8.9	8.1	8.6
11/11/91	8.0	5.6	6.7	7.8	5.6	6.7
11/12/91	7.8	5.3	6.6	7.7	5.3	6.5
11/13/91	8.4	6.8	7.8	8.2	6.7	7.6
11/14/91	6.9	4.2	5.4	6.9	4.4	5.4

Appendix B. Maximum, minimum, and mean daily temperatures in the Snake River, Idaho during December 1990 through July 1991.

Pump station below Bliss Bridge				Lower Salmon Falls Dam		
Date	Daily Temperatures (°C)			Daily Temperatures (°C)		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
12/11/90	10.8	10.1	10.4	9.8	9.2	9.6
12/12/90	10.4	9.8	10.0	9.5	8.4	9.1
12/13/90	10.3	9.7	10.0	9.4	8.8	9.2
12/14/90	9.7	8.8	9.2	8.6	7.6	8.2
12/15/90	9.0	8.6	8.8	8.1	7.1	7.9
12/16/90	9.2	8.5	8.8	8.1	6.9	7.7
12/17/90	9.2	8.6	8.9	8.5	7.1	7.9
12/18/90	9.8	9.2	9.4	8.8	7.8	8.4
12/19/90	9.8	8.8	9.2	8.5	7.8	8.3
12/20/90	9.2	7.8	8.6	7.9	6.6	7.4
12/21/90	8.2	6.8	7.5	7.0	4.9	6.2
12/22/90	7.4	6.4	7.0	5.8	3.9	5.3
12/23/90	6.9	6.1	6.5	5.4	3.9	5.1
12/24/90	6.9	6.1	6.5	5.7	4.0	5.1
12/25/90	7.1	6.3	6.6	5.8	4.0	5.2
12/26/90	7.9	6.7	7.3	6.7	4.6	6.0
12/27/90	8.6	7.4	8.1	7.6	5.6	6.9
12/28/90	9.2	8.3	8.7	7.9	6.5	7.6
12/29/90	8.4	6.3	7.4	7.4	5.1	6.2
12/30/90	6.9	5.9	6.3	5.6	3.6	4.8
12/31/90	7.8	6.6	7.1	6.3	4.3	5.6
01/01/91	8.1	7.3	7.8	7.3	5.1	6.6
01/02/91	8.7	7.8	8.2	7.3	5.6	6.9
01/03/91	8.9	8.1	8.3	7.7	5.4	7.1
01/04/91	8.9	8.1	8.3	7.5	5.9	7.1
01/05/91	8.8	8.0	8.3	7.4	5.5	7.0
01/06/91	8.9	8.1	8.4	7.6	5.6	7.1
01/07/91	9.2	8.5	8.9	8.5	6.6	7.8
01/08/91	9.7	9.0	9.4	8.9	7.8	8.5
01/09/91	9.8	9.2	9.5	8.9	8.4	8.7
01/10/91	9.8	9.2	9.5	8.9	8.1	8.6
01/11/91	10.1	9.5	9.8	9.5	8.5	9.0
01/12/91	10.3	9.8	10.1	9.5	9.1	9.3
01/13/91	10.6	10.0	10.2	9.8	9.2	9.5
01/14/91	10.3	9.8	10.1	9.5	9.1	9.3
01/15/91	10.3	9.7	10.0	9.5	9.1	9.3
01/16/91	10.0	9.1	9.5	9.0	8.4	8.7

Appendix B. Continued.

Pump station below Bliss Bridge				Lower Salmon Falls Dam		
Date	Daily Temperatures (°C)			Daily Temperatures (°C)		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
01/17/91	9.9	9.2	9.6	9.0	8.2	8.7
01/18/91	10.2	9.7	10.0	9.5	8.9	9.3
01/19/91	10.3	9.2	9.8	9.4	8.5	9.0
01/20/91	9.7	8.9	9.2	8.5	8.1	8.3
01/21/91	9.3	8.8	9.0	8.2	7.9	8.1
01/22/91	9.3	8.7	9.0	8.2	7.8	8.0
01/23/91	9.3	8.8	9.1	8.4	7.9	8.1
01/24/91	9.3	8.5	8.9	8.2	7.6	8.1
01/25/91	9.1	8.1	8.6	7.6	6.8	7.3
01/26/91	8.9	8.5	8.6	8.2	7.2	7.7
01/27/91	9.2	8.2	8.6	7.7	6.9	7.5
01/28/91	9.0	8.2	8.5	7.7	6.7	7.4
01/29/91	8.9	7.6	8.0	7.2	6.7	6.9
01/30/91	8.3	7.6	7.9	7.3	5.5	6.7
01/31/91	8.6	7.8	8.3	7.5	5.7	7.0
02/01/91	8.9	8.2	8.6	8.0	6.9	7.6
02/02/91	9.3	8.6	9.0	8.2	7.2	8.0
02/03/91	9.8	8.9	9.4	9.0	8.1	8.5
02/04/91	10.4	9.6	10.1	9.6	8.2	9.2
02/05/91	10.7	10.0	10.5	10.0	8.8	9.7
02/06/91	11.1	10.7	10.9	10.5	9.6	10.1
02/07/91	11.4	11.0	11.1	10.7	9.6	10.4
02/08/91	11.4	11.0	11.1	10.8	9.8	10.5
02/09/91	11.4	10.9	11.2	10.8	9.9	10.5
02/10/91	11.4	10.8	11.2	10.8	9.9	10.5
02/11/91	11.5	11.0	11.2	11.0	9.5	10.5
02/12/91	11.4	11.1	11.3	10.9	10.0	10.7
02/13/91	11.6	11.3	11.4	10.9	10.3	10.7
02/14/91	12.0	11.1	11.6	11.5	10.6	11.1
02/15/91	12.5	11.7	12.1	12.1	10.6	11.6
02/16/91	12.6	12.1	12.3	12.1	11.6	11.9
02/17/91	12.1	11.1	11.7	11.5	10.5	11.1
02/18/91	11.1	10.3	10.7	10.4	9.6	10.0
02/19/91	11.0	10.4	10.7	10.4	9.1	9.9
02/20/91	11.8	10.7	11.3	11.1	9.6	10.6
02/21/91	12.1	11.4	11.8	11.4	10.1	11.0
02/22/91	12.4	11.7	12.0	11.9	10.5	11.5
02/23/91	12.3	11.4	11.9	11.6	10.6	11.2

Appendix B. Continued.

Pump station below Bliss Bridge				Lower Salmon Falls Dam		
Date	Daily Temperatures (°C)			Daily Temperatures (°C)		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
02/24/91	11.8	11.3	11.4	11.0	10.2	10.8
02/25/91	12.1	11.3	11.7	11.3	10.0	11.0
02/26/91	12.2	11.4	11.8	11.6	10.0	11.1
02/27/91	12.3	11.6	11.9	11.4	10.3	11.1
02/28/91	11.8	11.6	11.7	11.2	10.2	11.0
03/01/91	12.0	11.7	11.9	11.4	10.7	11.1
03/02/91	12.3	11.8	12.0	11.8	11.4	11.6
03/03/91	12.3	11.9	12.0	11.8	11.5	11.6
03/04/91	12.1	11.9	12.1	11.8	11.5	11.6
03/05/91	12.0	11.3	11.7	11.5	11.0	11.3
03/06/91	11.4	10.8	11.2	10.9	10.3	10.6
03/07/91	11.1	10.5	10.8	10.3	10.0	10.1
03/08/91	11.4	10.6	11.0	10.4	10.0	10.3
03/09/91	11.8	10.8	11.3	11.2	10.4	10.8
03/10/91	12.3	11.6	11.9	11.4	11.2	11.3
03/11/91	12.0	11.3	11.7	11.5	11.0	11.3
03/12/91	11.9	11.3	11.6	11.1	10.8	10.9
03/13/91	12.1	11.3	11.8	11.5	10.9	11.2
03/14/91	12.3	11.6	11.9	11.5	11.1	11.3
03/15/91	12.3	11.3	11.7	11.2	11.0	11.1
03/16/91	12.6	11.5	12.0	11.8	11.2	11.5
03/17/91	13.0	12.0	12.4	12.3	11.8	12.0
03/18/91	13.2	12.3	12.7	12.6	12.1	12.4
03/19/91	13.1	12.6	12.8	12.6	12.3	12.5
03/20/91	13.4	12.5	12.8	12.6	12.3	12.4
03/21/91	13.4	12.4	12.7	12.6	12.2	12.4
03/22/91	12.8	12.2	12.5	12.5	11.8	12.1
03/23/91	12.6	12.2	12.3	12.1	11.8	11.9
03/24/91	13.1	12.1	12.5	12.3	12.0	12.2
03/25/91	12.6	12.1	12.4	12.3	11.9	12.1
03/26/91	12.7	12.1	12.4	12.2	11.8	11.9
03/27/91	12.8	12.0	12.3	12.1	11.8	11.9
03/28/91	12.7	11.7	12.1	11.8	11.7	11.8
03/29/91	12.5	11.6	12.0	11.8	11.3	11.5
03/30/91	12.6	11.4	12.0	11.9	11.1	11.4
03/31/91	13.4	12.0	12.7	13.0	11.8	12.4

Appendix B. Continued.

Pump station below Bliss Bridge				Lower Salmon Falls Dam		
Date	Daily Temperatures (°C)			Daily Temperatures (°C)		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
04/01/91	14.0	12.8	13.3	13.5	12.9	13.2
04/02/91	14.0	13.2	13.5	13.5	13.3	13.4
04/03/91	14.1	13.2	13.6	13.5	13.1	13.4
04/04/91	14.4	13.3	13.8	14.1	13.3	13.7
04/05/91	14.5	13.9	14.1	14.2	13.5	14.0
04/06/91	14.4	13.8	14.1	14.1	13.6	14.0
04/07/91	13.9	13.1	13.5	13.9	12.8	13.4
04/08/91	13.4	12.3	12.9	12.8	11.9	12.4
04/09/91	12.8	12.3	12.6	12.6	11.6	12.2
04/10/91	12.4	11.5	12.1	12.1	10.9	11.7
04/11/91	----	----	----	----	----	----
04/12/91	----	----	----	----	----	----
04/13/91	12.7	11.3	12.0	----	----	----
04/14/91	13.1	12.0	12.6	----	----	----
04/15/91	13.4	12.7	12.9	----	----	----
04/16/91	13.6	12.8	13.1	----	----	----
04/17/91	13.9	12.8	13.3	----	----	----
04/18/91	13.5	12.8	13.2	----	----	----
04/19/91	13.9	12.6	13.3	----	----	----
04/20/91	14.1	13.2	13.6	----	----	----
04/21/91	14.4	13.6	13.8	----	----	----
04/22/91	14.8	13.6	14.2	----	----	----
04/23/91	15.1	13.9	14.6	----	----	----
04/24/91	14.9	14.1	14.5	----	----	----
04/25/91	14.4	13.0	13.8	----	----	----
04/26/91	13.4	12.3	12.8	----	----	----
04/27/91	12.8	11.6	12.2	----	----	----
04/28/91	12.3	11.6	11.9	----	----	----
04/29/91	12.1	11.6	11.8	----	----	----
04/30/91	12.7	11.6	12.1	----	----	----
05/01/91	13.6	12.1	12.9	----	----	----
05/02/91	13.4	13.1	13.2	----	----	----
05/03/91	13.7	13.0	13.3	----	----	----
05/04/91	14.1	13.0	13.5	----	----	----
05/05/91	14.5	13.3	13.9	----	----	----
05/06/91	14.9	14.0	14.4	----	----	----
05/07/91	15.3	14.4	14.8	----	----	----
05/08/91	15.3	14.3	14.8	----	----	----

Appendix B. Continued.

Pump station below Bliss Bridge				Lower Salmon Falls Dam		
Date	Daily Temperatures (°C)			Daily Temperatures (°C)		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
05/09/91	14.4	13.1	13.8	----	----	----
05/10/91	13.5	12.7	13.0	----	----	----
05/11/91	13.6	12.7	13.3	----	----	----
05/12/91	14.3	13.2	13.8	----	----	----
05/13/91	14.5	13.6	14.1	----	----	----
05/14/91	14.7	13.5	14.1	----	----	----
05/15/91	15.0	13.4	14.1	----	----	----
05/16/91	15.5	13.7	14.6	----	----	----
05/17/91	15.1	14.7	14.9	----	----	----
05/18/91	14.6	13.6	14.3	----	----	----
05/19/91	14.5	13.4	13.9	----	----	----
05/20/91	15.0	13.8	14.4	----	----	----
05/21/91	15.9	14.3	15.1	----	----	----
05/22/91	16.1	14.0	15.6	----	----	----
05/23/91	16.5	15.0	15.8	----	----	----
05/24/91	16.8	15.1	16.1	----	----	----
05/25/91	16.8	15.3	16.1	----	----	----
05/26/91	16.2	14.8	15.4	----	----	----
05/27/91	15.6	14.5	15.0	----	----	----
05/28/91	15.9	14.4	15.1	----	----	----
05/29/91	16.0	14.9	15.4	----	----	----
05/30/91	15.9	14.7	15.3	----	----	----
05/31/91	15.9	14.5	15.0	----	----	----
06/01/91	16.2	14.4	15.3	----	----	----
06/02/91	16.9	15.1	16.1	----	----	----
06/03/91	17.4	15.9	16.6	----	----	----
06/04/91	16.8	15.5	16.2	----	----	----
06/05/91	15.6	14.6	15.3	----	----	----
06/06/91	15.8	14.4	15.6	----	----	----
06/07/91	15.8	14.4	15.1	----	----	----
06/08/91	16.5	14.8	15.8	----	----	----
06/09/91	17.3	15.6	16.5	----	----	----
06/10/91	17.9	16.1	17.0	----	----	----
06/11/91	18.3	16.7	17.5	----	----	----
06/12/91	18.3	16.4	17.3	----	----	----
06/13/91	17.5	15.7	16.7	----	----	----
06/14/91	16.8	15.4	16.0	----	----	----
06/15/91	16.8	15.2	16.0	----	----	----

Appendix B. Continued.

Pump station below Bliss Bridge				Lower Salmon Falls Dam		
Date	Daily Temperatures (°C)			Daily Temperatures (° t,)		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
06/16/91	17.2	15.6	16.4	----	----	----
06/17/91	17.1	15.6	16.34	----	----	----
06/18/91	17.0	15.5	16.34	----	----	----
06/19/91	17.3	16.0	16.64	----	----	----
06/20/91	17.3	15.9	16.64	----	----	----
06/21/91	17.2	15.9	16.54	----	----	----
06/22/91	17.5	15.9	16.74	----	----	----
06/23/91	17.6	16.1	16.94	----	----	----
06/24/91	17.3	16.1	16.74	----	----	----
06/25/91	17.1	15.8	16.34	----	----	----
06/26/91	16.9	15.7	16.24	----	----	----
06/27/91	16.4	15.7	16.14	----	----	----
06/28/91	16.8	15.6	16.24	----	----	----
06/29/91	16.8	15.8	16.34	----	----	----
06/30/91	17.1	15.8	16.44	----	----	----
07/01/91	17.5	15.9	16.74	----	----	----
07/02/91	18.3	16.4	17.34	----	----	----
07/03/91	18.6	16.8	17.84	----	----	----
07/04/91	19.0	17.2	18.14	----	----	----
07/05/91	19.2	17.6	18.34	----	----	----
07/06/91	19.1	17.5	18.24	----	----	----
07/07/91	19.0	17.3	18.14	----	----	----

Appendix G. Questionnaire and results used on South Fork Boise River in 1991.

Because of the geology of the lands it flows through, the upper South Fork Boise River is a relatively sterile stream. Despite the high quality habitat, wild trout populations are easily overfished. A short food supply limits the number of fish the habitat can support, and the easy access afforded by the road makes wild fish vulnerable to being overharvested. The Department has attempted to maintain a fishery by stocking catchable trout throughout the season. However, studies have shown that only 2 of every 10 trout stocked in the upper South Fork are actually caught by anglers - a poor return rate when it costs more than 40 cents a piece to stock catchable trout.

One alternative management scheme would be to zone the river. This would allow a portion of the river to be managed with restrictive regulations to rebuild the wild trout fishery. A similar program on the Middle Fork Boise has improved catch rates for wild trout by 50% to 100%. Areas where catchable trout would likely contribute the most to angler's creels would be stocked more heavily and frequently, resulting in little or no change in the total number stocked. This was done on the Middle Fork, and catch rates for hatchery trout nearly doubled.

As a South Fork Boise River angler, we are interested in whether you believe a change in management would be beneficial. Please answer the following questions and return this to the Region 4 office in the attached, stamped envelope. Your input is important to us in managing your fisheries.

- A. Would you be in favor of zoning a portion of the South Fork Boise for wild trout if it meant:

	<u>Public</u>		<u>On</u>	
	<u>Meetings</u>		<u>River</u>	
	N = 14		N = 40	
	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>
1. No reduction in the total number of fish stocked?	50%	36%	98%	2%
2. Reduced bag limits in the wild trout section?	93%	7%	82%	15%
3. Size limits in the wild trout section?	86%	0%	80%	18%
4. Catch and release in the wild trout section?	57%	36%	45%	50%
5. Gear restrictions (no bait) in the wild trout section?	64%	28%	42%	52%

- B. From the backwaters of Anderson Ranch Reservoir to Big Smoky Creek on the South Fork Boise River is approximately 40 miles. If a portion of this were to be zoned for wild trout, approximately how many miles should this zone be?

	Public meetings	On River
	<u>N = 14</u>	<u>N = 40</u>
1. Less than 10 miles	7%	30%
2. 10 to 15 miles	57%	45%
3. 15 to 20 miles	14%	22%
4. More than 20 miles	7%	2%

- C. Please make any additional comments on the back side of this page.

Thank you for your input,

Chip Corsi
Regional Fisheries Manager

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management
Investigations

Project No: F-71-R-16

Title: Region 4 Technical Guidance

Job No. 4-d

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

Region 4 fishery management personnel furnished 125 written comments of technical guidance to other agencies and private individuals and organizations. A considerable amount of time was spent reviewing projects and developing comments and plans.

Stream alterations on the Big Wood River and tributaries required more time than other activities. Committee meetings and tours relating to Snake River water quality issues, along with hydropower proposals also required a significant amount of time.

Many miscellaneous activities were commented on, participated in, or otherwise addressed, and numerous meetings regarding fisheries were attended.

Author:

Fred E. Partridge
Regional Fishery Manager

OBJECTIVES

To furnish technical assistance, advice, guidance, and comments to other agencies, organizations, or individuals regarding any items, projects, or activities associated with or potentially affecting fishery resources and habitat in the region.

METHODS

Reviews, field inspections, comments, expertise, and recommendations were furnished to all governmental agencies, private organizations, and individuals upon request. We participated in meetings, tours, and gave presentations where requested or necessary.

RESULTS

Region 4 fishery management personnel responded to the following number of written requests from various agencies and individuals:

Idaho Department of Water Resources	77
Idaho Department of Lands	3
Environmental Protection Agency	1
Bureau of Land Management	4
U.S. Army Corps of Engineers	3
U.S. Forest Service	2
U.S. Fish and Wildlife Service	1
Outfitters and Guides	2
Other Miscellaneous	<u>32</u>
TOTAL	125

Miscellaneous Activities

- 1) Hydropower projects, both existing and proposed, continue to consume a significant amount of time for meetings, on-site reviews, and in preparation of comments.
- 2) Highway 75 project north of Ketchum: Spent considerable time, including monthly meetings, reviewing and commenting on plans, coordinating activities, developing habitat restoration plans, making on-site inspections, and salvaging fish from the dewatered reach. Activities were coordinated with the Bureau of Land Management, U.S. Forest Service, Idaho Department of Water Resources, and Idaho Transportation Department.
- 3) Reviewed and commented on potential impacts of a proposed U.S. Army Corps of Engineers flood control project on the Little Wood River.
- 4) We continued to participate in monthly meetings of the Middle Snake River Study Group and participated in a river tour. The group, directed by Jerome, Twin Falls, Gooding, and Lincoln counties, was established to develop programs for restoring and managing the Snake River between Milner and Bliss dams. Additional planning committees on the Snake River have been set up by the Idaho Department of Water Resources and the Idaho Department of Health and Welfare, Division of Environment Quality (DEQ).

- 5) Assisted DEQ with the Rock Creek clean water project work. Also gave technical advice on other DEQ and Soil Conservation Service projects in the region.
- 6) Worked on several habitat and river stabilization projects in the Big Wood River. We began experimenting with the incorporation of large complex woody material into drop structures. We also made numerous inspections and comments on stream alterations. Combined with the Highway 75 project, more time was spent addressing projects in the Big Wood River system than any other.
- 7) Provided fish and wildlife beneficial use information to support a minimum stream flow on Silver Creek below Highway 93.
- 8) Worked with the College of Southern Idaho on developing a white sturgeon culture program.
- 9) Responded to an overturned gasoline truck in the Jarbidge River with the Division of Environmental Quality. Gasoline was mostly contained, resulting in little environmental damage.

RECOMMENDATIONS

Technical guidance on issues involving fishery resources in Region 4 should be continued to assist in maintaining fishery resources in Region 4.

Because of the number of requests for technical guidance and the potential impacts of projects to remaining fish resources in Region 4, consideration should be given to adding staff in the region to administer habitat issues.

ACKNOWLEDGEMENTS

Most of the fisheries work in Region 4 during the last 2 years has been under the direction and guidance of Charles E. "Chip" Corsi. Chip has transferred north to the tall trees where we expect he will continue to bring his unique brand of humor and dedication to the protection of the resources of Region 1.